FIG. 1

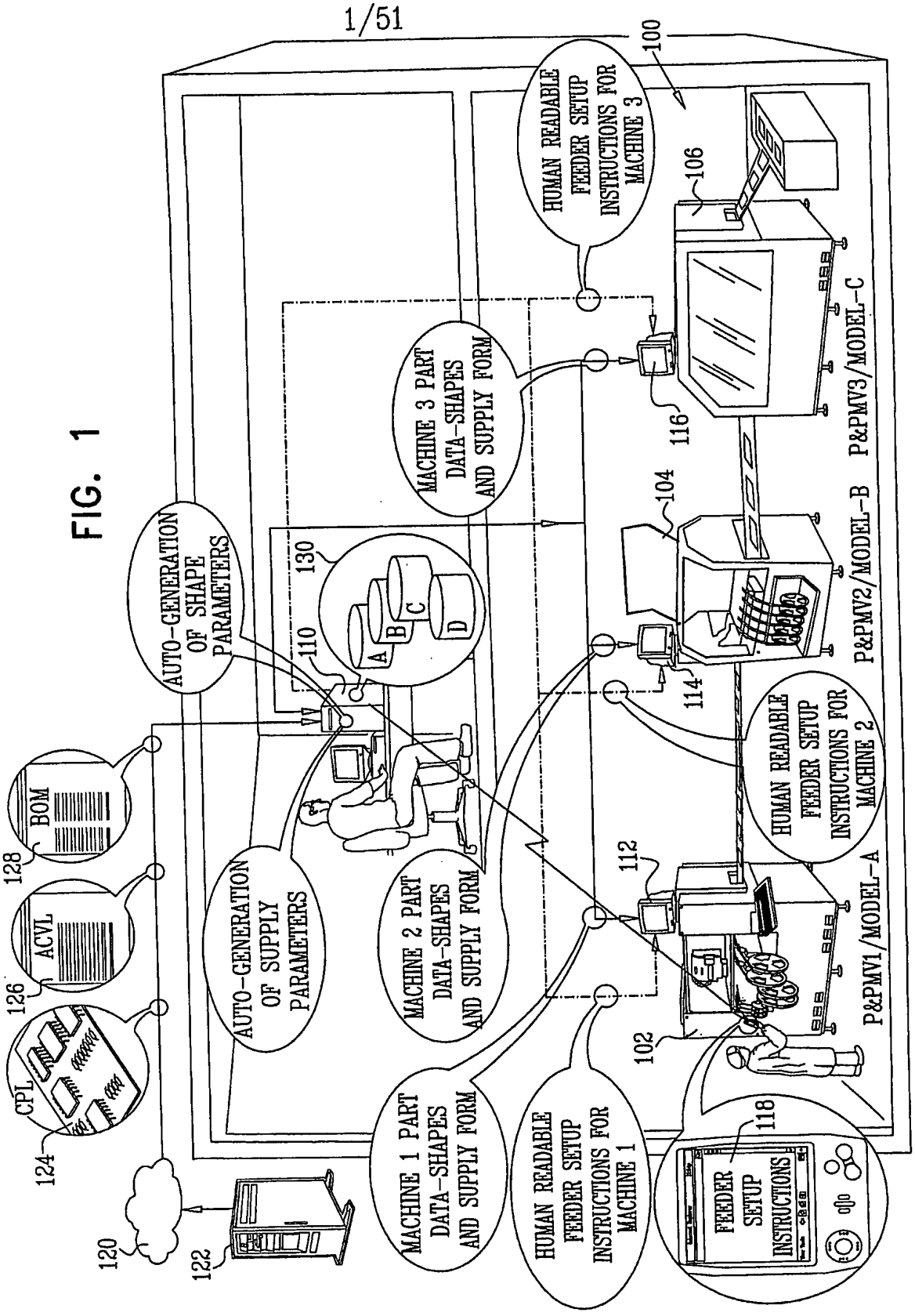

100
HUMAN READABLE FEEDER SETUP INSTRUCTIONS FOR MACHINE 3
MACHINE 3 PART DATA-SHAPES AND SUPPLY FORM
AUTO-GENERATION OF SHAPE PARAMETERS
106
116
104
P&PMV3/MODEL-C
P&PMV2/MODEL-B
130
A
B
C
D
110
114
HUMAN READABLE FEEDER SETUP INSTRUCTIONS FOR MACHINE 2
AUTO-GENERATION OF SUPPLY PARAMETERS
MACHINE 2 PART DATA-SHAPES AND SUPPLY FORM
112
128
BOM
126
ACVL
CPL
124
102
P&PMV1/MODEL-A
MACHINE 1 PART DATA-SHAPES AND SUPPLY FORM
HUMAN READABLE FEEDER SETUP INSTRUCTIONS FOR MACHINE 1
118
FEEDER SETUP INSTRUCTIONS
120
122

FIG. 2

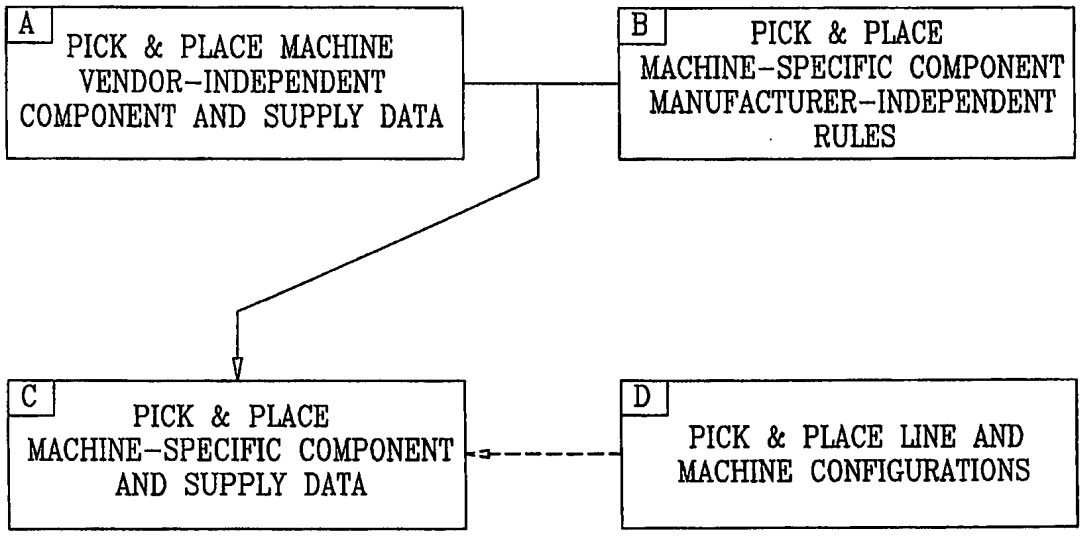

A
PICK & PLACE MACHINE VENDOR-INDEPENDENT COMPONENT AND SUPPLY DATA
B
PICK & PLACE MACHINE-SPECIFIC COMPONENT MANUFACTURER-INDEPENDENT RULES
C
PICK & PLACE MACHINE-SPECIFIC COMPONENT AND SUPPLY DATA
D
PICK & PLACE LINE AND MACHINE CONFIGURATIONS

FIG. 3

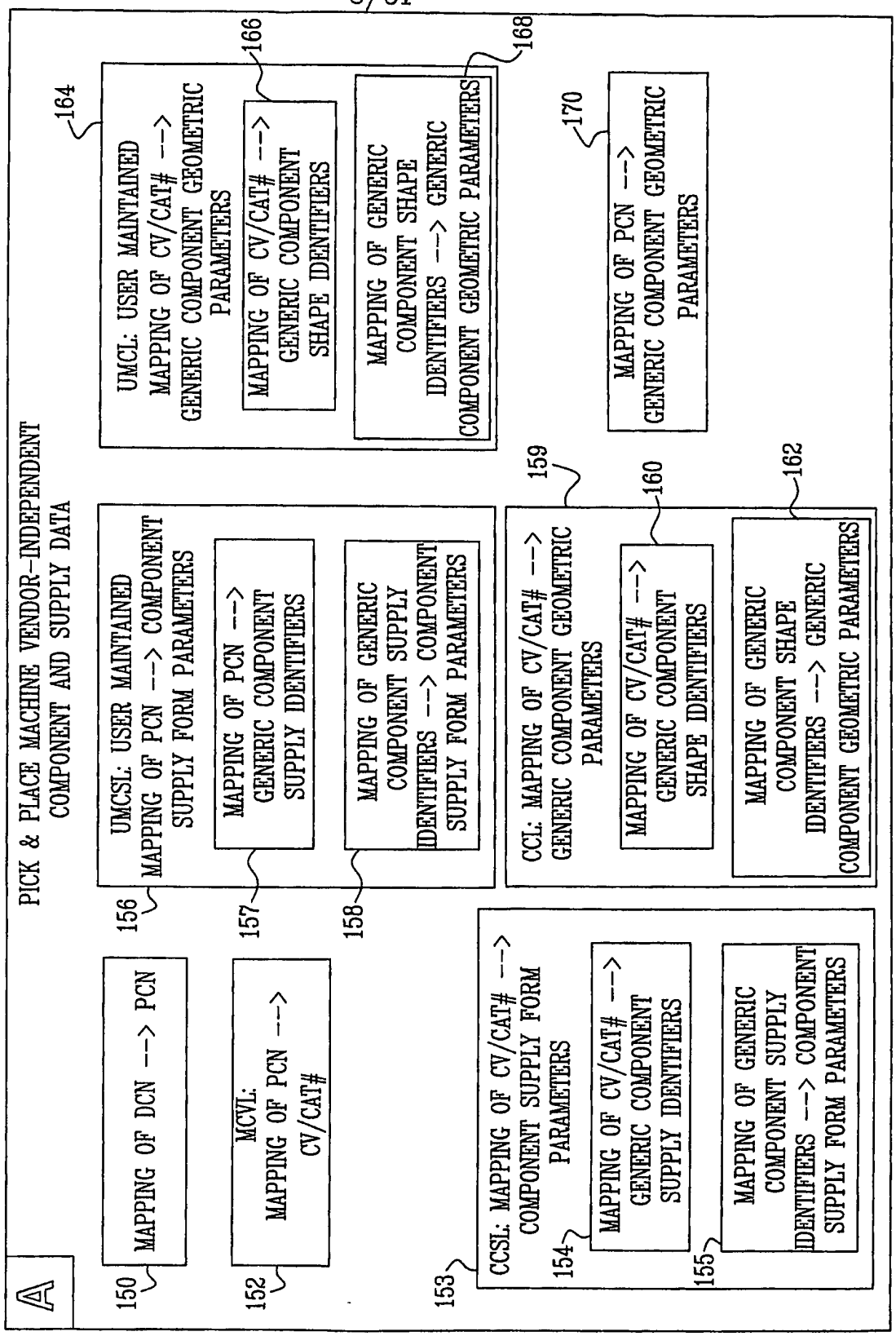

A
PICK & PLACE MACHINE VENDOR-INDEPENDENT COMPONENT AND SUPPLY DATA
150
MAPPING OF DCN --> PCN
152
MCVL: MAPPING OF PCN --> CV/CAT#
153
CCSL: MAPPING OF CV/CAT# --> COMPONENT SUPPLY FORM PARAMETERS
154
MAPPING OF CV/CAT# --> GENERIC COMPONENT SUPPLY IDENTIFIERS
155
MAPPING OF GENERIC COMPONENT SUPPLY IDENTIFIERS --> COMPONENT SUPPLY FORM PARAMETERS
156
UMCSL: USER MAINTAINED MAPPING OF PCN --> COMPONENT SUPPLY FORM PARAMETERS
157
MAPPING OF PCN --> GENERIC COMPONENT SUPPLY IDENTIFIERS
158
MAPPING OF GENERIC COMPONENT SUPPLY IDENTIFIERS --> COMPONENT SUPPLY FORM PARAMETERS
159
CCL: MAPPING OF CV/CAT# --> GENERIC COMPONENT GEOMETRIC PARAMETERS
160
MAPPING OF CV/CAT# --> GENERIC COMPONENT SHAPE IDENTIFIERS
162
MAPPING OF GENERIC COMPONENT SHAPE IDENTIFIERS --> GENERIC COMPONENT GEOMETRIC PARAMETERS
164
UMCL: USER MAINTAINED MAPPING OF CV/CAT# --> GENERIC COMPONENT GEOMETRIC PARAMETERS
166
MAPPING OF CV/CAT# --> GENERIC COMPONENT SHAPE IDENTIFIERS
168
MAPPING OF GENERIC COMPONENT SHAPE IDENTIFIERS --> GENERIC COMPONENT GEOMETRIC PARAMETERS
170
MAPPING OF PCN --> GENERIC COMPONENT GEOMETRIC PARAMETERS

FIG. 4

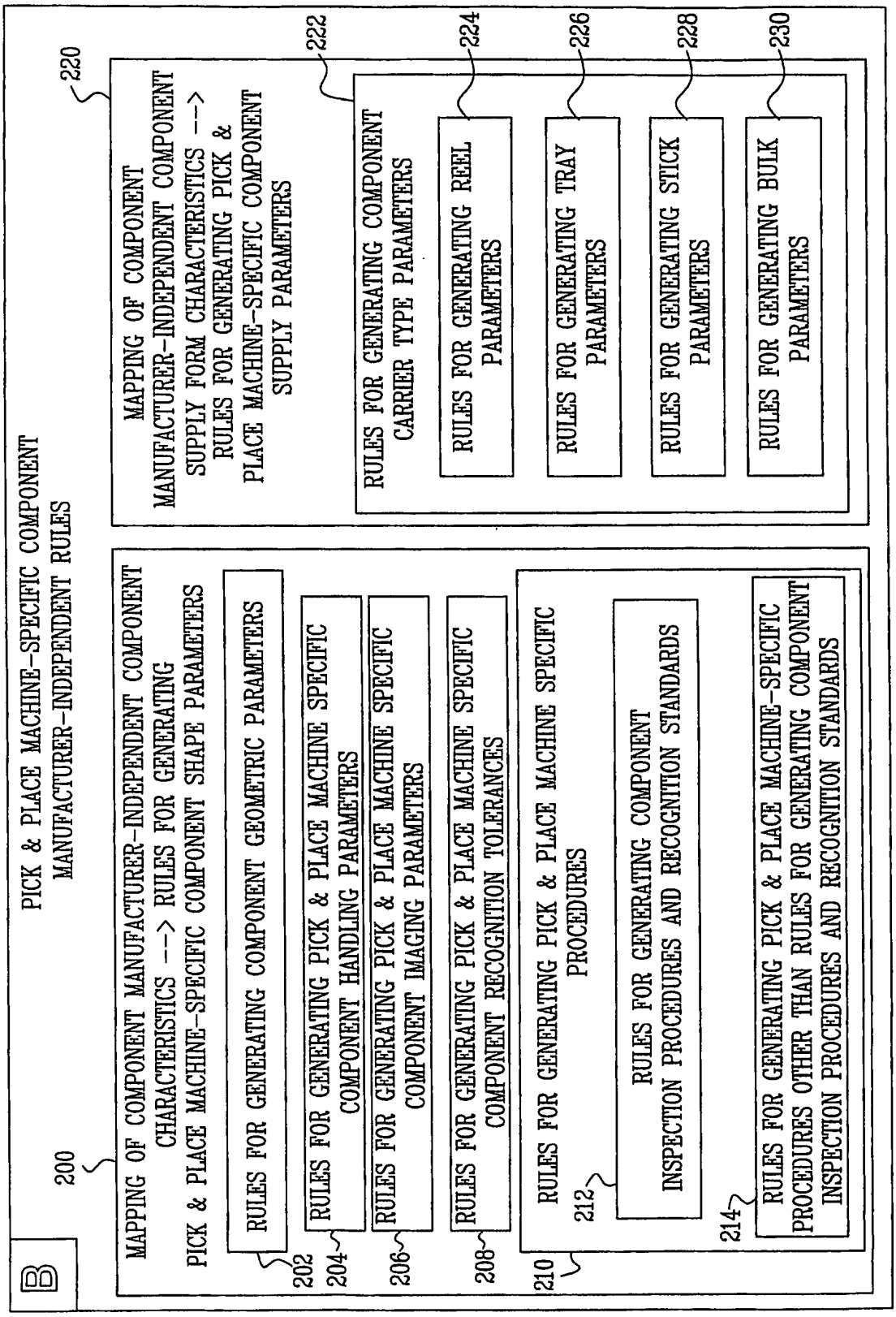

B
PICK & PLACE MACHINE-SPECIFIC COMPONENT MANUFACTURER-INDEPENDENT RULES
200
MAPPING OF COMPONENT MANUFACTURER-INDEPENDENT COMPONENT CHARACTERISTICS --> RULES FOR GENERATING PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE PARAMETERS
RULES FOR GENERATING COMPONENT GEOMETRIC PARAMETERS
202
RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT HANDLING PARAMETERS
204
RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT IMAGING PARAMETERS
206
RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT RECOGNITION TOLERANCES
208
RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC PROCEDURES
210
RULES FOR GENERATING COMPONENT INSPECTION PROCEDURES AND RECOGNITION STANDARDS
212
RULES FOR GENERATING PICK & PLACE MACHINE-SPECIFIC PROCEDURES OTHER THAN RULES FOR GENERATING COMPONENT INSPECTION PROCEDURES AND RECOGNITION STANDARDS
214
220
MAPPING OF COMPONENT MANUFACTURER-INDEPENDENT COMPONENT SUPPLY FORM CHARACTERISTICS --> RULES FOR GENERATING PICK & PLACE MACHINE-SPECIFIC COMPONENT SUPPLY PARAMETERS
222
RULES FOR GENERATING COMPONENT CARRIER TYPE PARAMETERS
224
RULES FOR GENERATING REEL PARAMETERS
226
RULES FOR GENERATING TRAY PARAMETERS
228
RULES FOR GENERATING STICK PARAMETERS
230
RULES FOR GENERATING BULK PARAMETERS

FIG. 5A

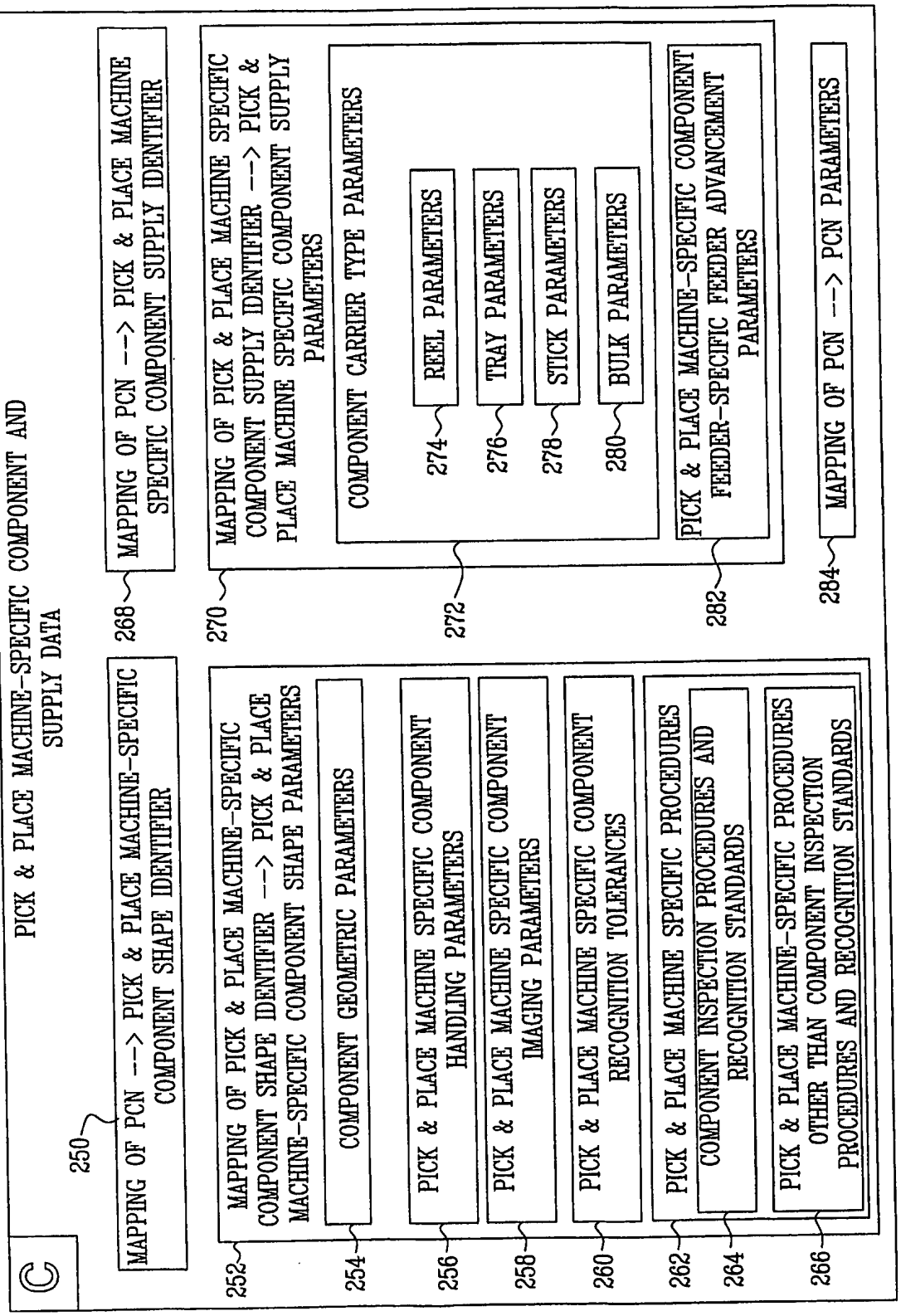
PICK & PLACE MACHINE SPECIFIC COMPONENT REEL PARAMETER	RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT REEL PARAMETER
MACHINE FEED	=(REEL PITCH/MACHINE FEED DISTANCE) 232
MACHINE SUB-FEED	{IF (REEL PITCH - ((REEL PITCH/MACHINE FEED DISTANCE)*MACHINE FEED DISTANCE)) > 0} THEN =(REEL PITCH - ((REEL PITCH/MACHINE FEED DISTANCE)*MACHINE FEED DISTANCE)/MACHINE SUB-FEED DISTANCE) ELSE NOT RELEVANT 234
. . .	. . .
NUMBER OF SLOTS	IF {(TAPE WIDTH - ((TAPE WIDTH/SLOT WIDTH)*SLOT WIDTH) == 0} THEN =(TAPE WIDTH/SLOT WIDTH) ELSE =((TAPE WIDTH/SLOT WIDTH)+1)

FIG. 5B

PICK & PLACE MACHINE SPECIFIC COMPONENT SHAPE PARAMETER / COMPONENT MANUFACTURER–INDEPENDENT COMPONENT CHARACTERISTIC (COMPONENT TYPE)	BGA	QFP	CONNECTORS
PICKUP DEPTH	=COMPONENT HEIGHT	=COMPONENT HEIGHT	=COMPONENT HEIGHT
⋮	⋮	⋮	⋮
NAMED NOZZLE	NOT RELEVANT	NOT RELEVANT	IF {(MAX(X DIMENSION, Y DIMENSION)/MIN(X DIMENSION, Y DIMENSION))>=2 && MIN(X DIMENSION, Y DIMENSION)>=8} THEN ="LARGEST NOZZLE" ELSEIF {(MAX(X DIMENSION, Y DIMENSION)/MIN(X DIMENSION, Y DIMENSION))<2 } THEN NOT RELEVANT ELSE THEN ="MEDIUM NOZZLE"
MINIMUM NOZZLE	=MIN(X DIMENSION, Y DIMENSION)*0.7	=MIN(X DIMENSION, Y DIMENSION)*0.7	IF {(MAX(X DIMENSION, Y DIMENSION)/MIN(X DIMENSION, Y DIMENSION))<2} THEN =MIN(X DIMENSION, Y DIMENSION)*0.7 ELSE NOT RELEVANT
MAXIMUM NOZZLE	=MAX(X DIMENSION, Y DIMENSION)*0.95	=MAX(X DIMENSION, Y DIMENSION)*0.95	IF {(MAX(X DIMENSION, Y DIMENSION)/MIN(X DIMENSION, Y DIMENSION))<2} THEN =MIN(X DIMENSION, Y DIMENSION)*0.95 ELSE NOT RELEVANT

242 244 246

FIG. 6


PICK & PLACE MACHINE-SPECIFIC COMPONENT AND SUPPLY DATA
250
MAPPING OF PCN --> PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE IDENTIFIER
252
MAPPING OF PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE IDENTIFIER --> PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE PARAMETERS
254
COMPONENT GEOMETRIC PARAMETERS
256
PICK & PLACE MACHINE SPECIFIC COMPONENT HANDLING PARAMETERS
258
PICK & PLACE MACHINE SPECIFIC COMPONENT IMAGING PARAMETERS
260
PICK & PLACE MACHINE SPECIFIC COMPONENT RECOGNITION TOLERANCES
262
PICK & PLACE MACHINE SPECIFIC PROCEDURES
264
COMPONENT INSPECTION PROCEDURES AND RECOGNITION STANDARDS
266
PICK & PLACE MACHINE-SPECIFIC PROCEDURES OTHER THAN COMPONENT INSPECTION PROCEDURES AND RECOGNITION STANDARDS
268
MAPPING OF PCN --> PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY IDENTIFIER
270
MAPPING OF PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY IDENTIFIER --> PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY PARAMETERS
272
COMPONENT CARRIER TYPE PARAMETERS
274
REEL PARAMETERS
276
TRAY PARAMETERS
278
STICK PARAMETERS
280
BULK PARAMETERS
282
PICK & PLACE MACHINE-SPECIFIC COMPONENT FEEDER-SPECIFIC FEEDER ADVANCEMENT PARAMETERS
284
MAPPING OF PCN --> PCN PARAMETERS

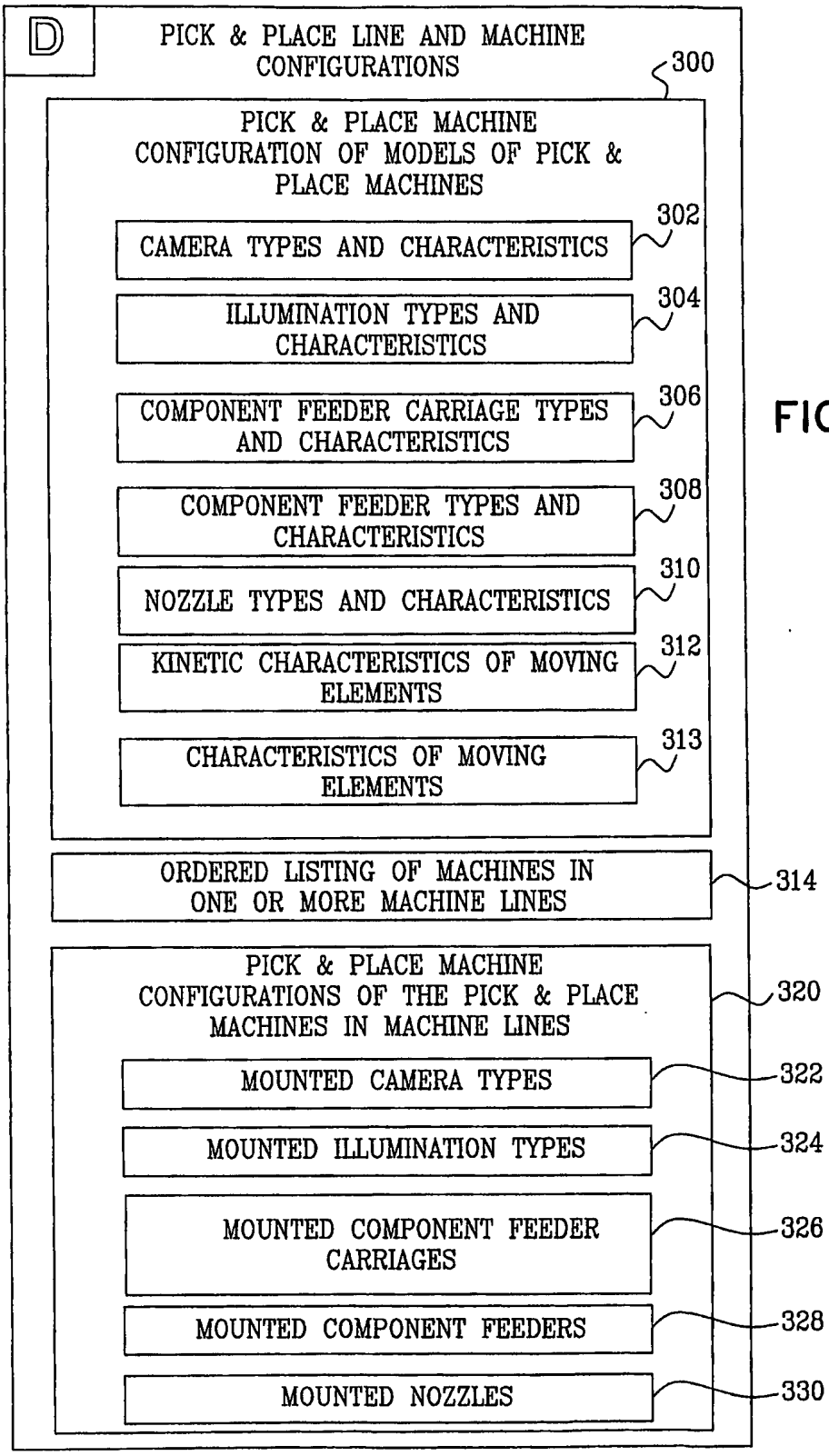

D
PICK & PLACE LINE AND MACHINE CONFIGURATIONS
300
PICK & PLACE MACHINE CONFIGURATION OF MODELS OF PICK & PLACE MACHINES
CAMERA TYPES AND CHARACTERISTICS
302
ILLUMINATION TYPES AND CHARACTERISTICS
304
COMPONENT FEEDER CARRIAGE TYPES AND CHARACTERISTICS
306
COMPONENT FEEDER TYPES AND CHARACTERISTICS
308
NOZZLE TYPES AND CHARACTERISTICS
310
KINETIC CHARACTERISTICS OF MOVING ELEMENTS
312
CHARACTERISTICS OF MOVING ELEMENTS
313
ORDERED LISTING OF MACHINES IN ONE OR MORE MACHINE LINES
314
PICK & PLACE MACHINE CONFIGURATIONS OF THE PICK & PLACE MACHINES IN MACHINE LINES
320
MOUNTED CAMERA TYPES
322
MOUNTED ILLUMINATION TYPES
324
MOUNTED COMPONENT FEEDER CARRIAGES
326
MOUNTED COMPONENT FEEDERS
328
MOUNTED NOZZLES
330

FIG. 7

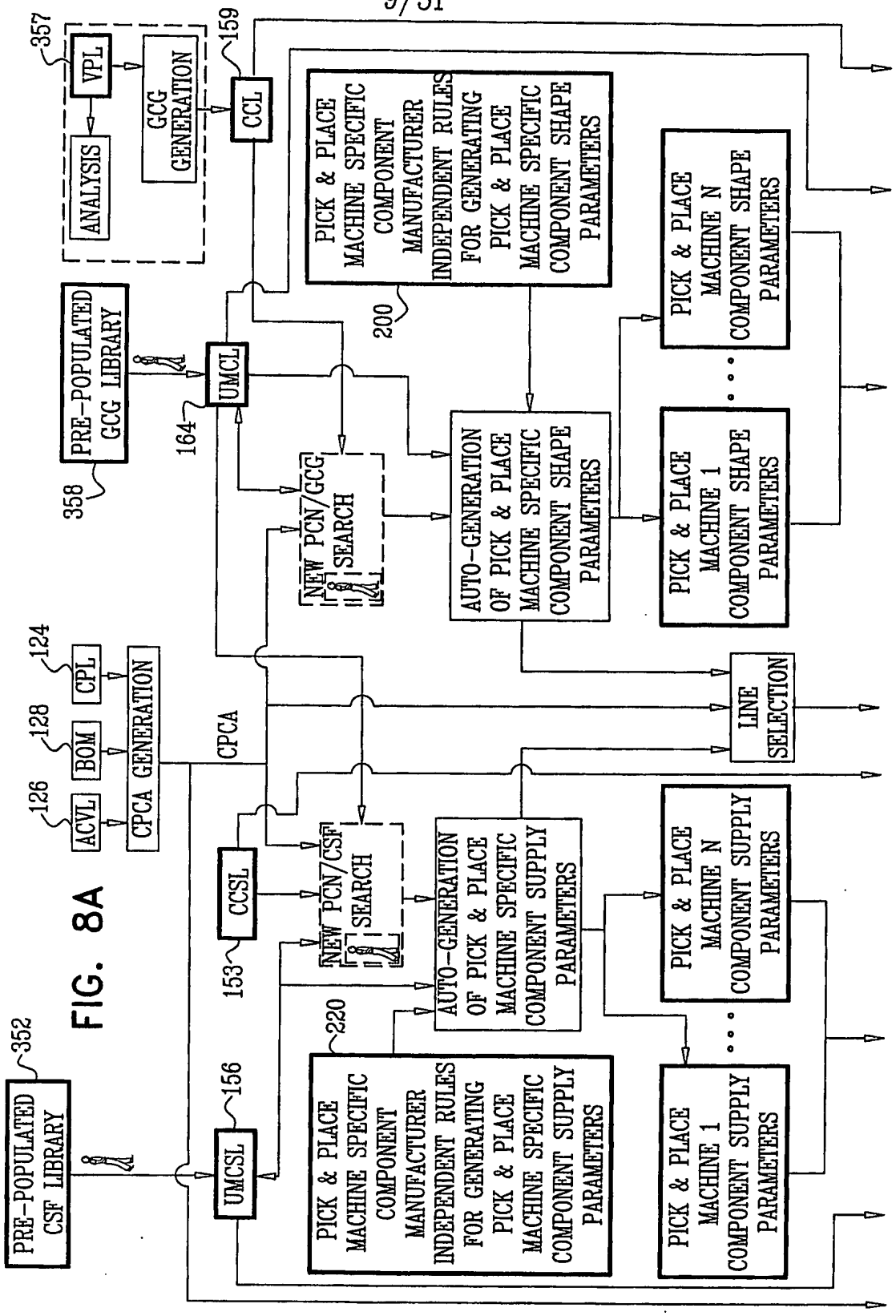

PRE-POPULATED CSF LIBRARY
352
UMCSL
156
PICK & PLACE MACHINE SPECIFIC COMPONENT MANUFACTURER INDEPENDENT RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY PARAMETERS
220
CCSL
153
NEW PCN/CSF SEARCH
AUTO-GENERATION OF PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY PARAMETERS
PICK & PLACE MACHINE 1 COMPONENT SUPPLY PARAMETERS
PICK & PLACE MACHINE N COMPONENT SUPPLY PARAMETERS
ACVL
126
BOM
128
CPL
124
CPCA GENERATION
CPCA
LINE SELECTION
PRE-POPULATED GCG LIBRARY
358
UMCL
164
NEW PCN/GCG SEARCH
AUTO-GENERATION OF PICK & PLACE MACHINE SPECIFIC COMPONENT SHAPE PARAMETERS
PICK & PLACE MACHINE 1 COMPONENT SHAPE PARAMETERS
PICK & PLACE MACHINE N COMPONENT SHAPE PARAMETERS
PICK & PLACE MACHINE SPECIFIC COMPONENT MANUFACTURER INDEPENDENT RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT SHAPE PARAMETERS
200
CCL
159
GCG GENERATION
ANALYSIS
VPL
357

FIG. 8A

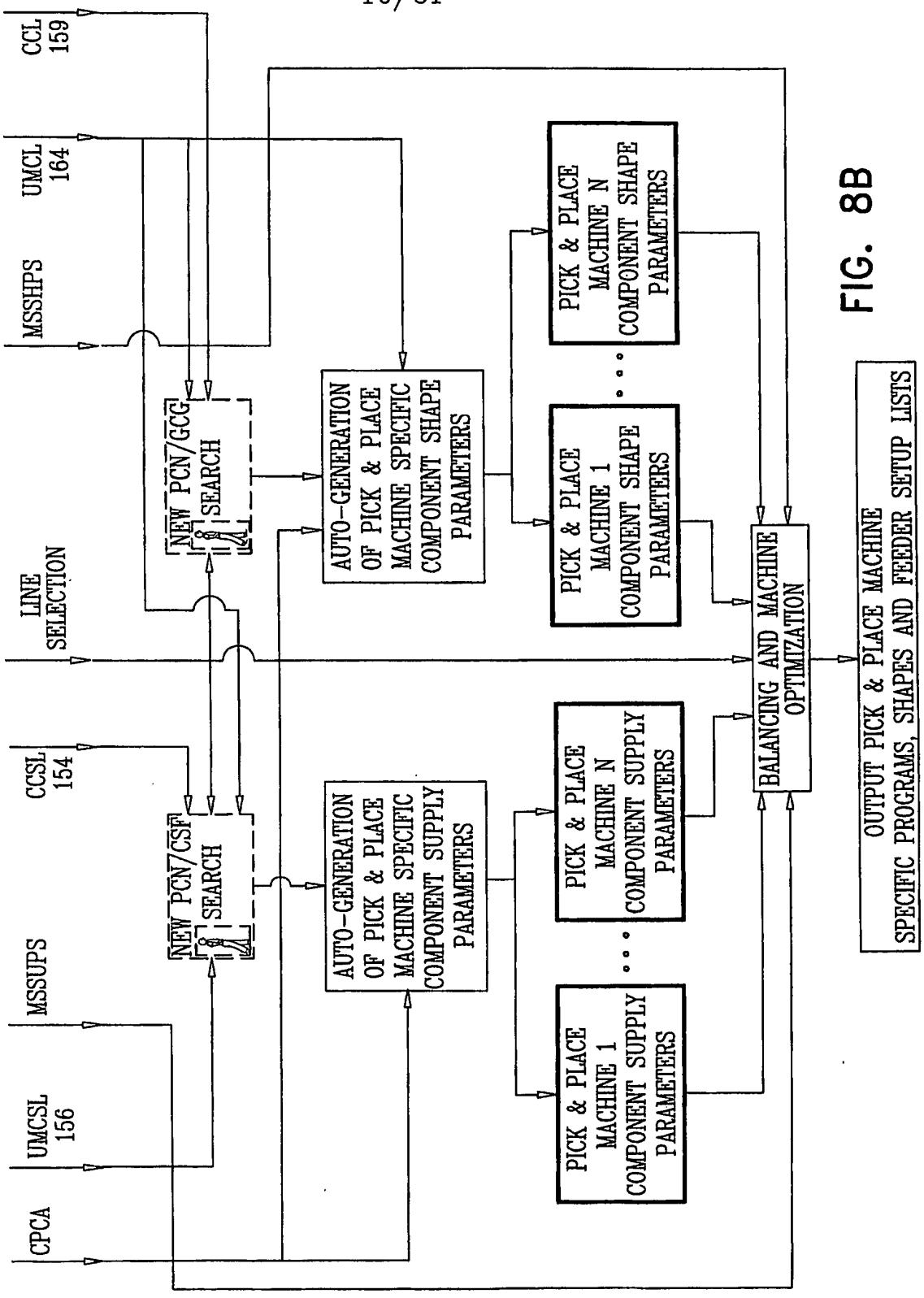

CCL 159
UMCL 164
MSSHPS
LINE SELECTION
CCSL 154
MSSUPS
UMCSL 156
CPCA
NEW PCN/GCG SEARCH
NEW PCN/CSF SEARCH
AUTO-GENERATION OF PICK & PLACE MACHINE SPECIFIC COMPONENT SHAPE PARAMETERS
AUTO-GENERATION OF PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY PARAMETERS
PICK & PLACE MACHINE 1 COMPONENT SHAPE PARAMETERS
PICK & PLACE MACHINE N COMPONENT SHAPE PARAMETERS
PICK & PLACE MACHINE 1 COMPONENT SUPPLY PARAMETERS
PICK & PLACE MACHINE N COMPONENT SUPPLY PARAMETERS
BALANCING AND MACHINE OPTIMIZATION
OUTPUT PICK & PLACE MACHINE SPECIFIC PROGRAMS, SHAPES AND FEEDER SETUP LISTS

FIG. 8B

FIG. 9

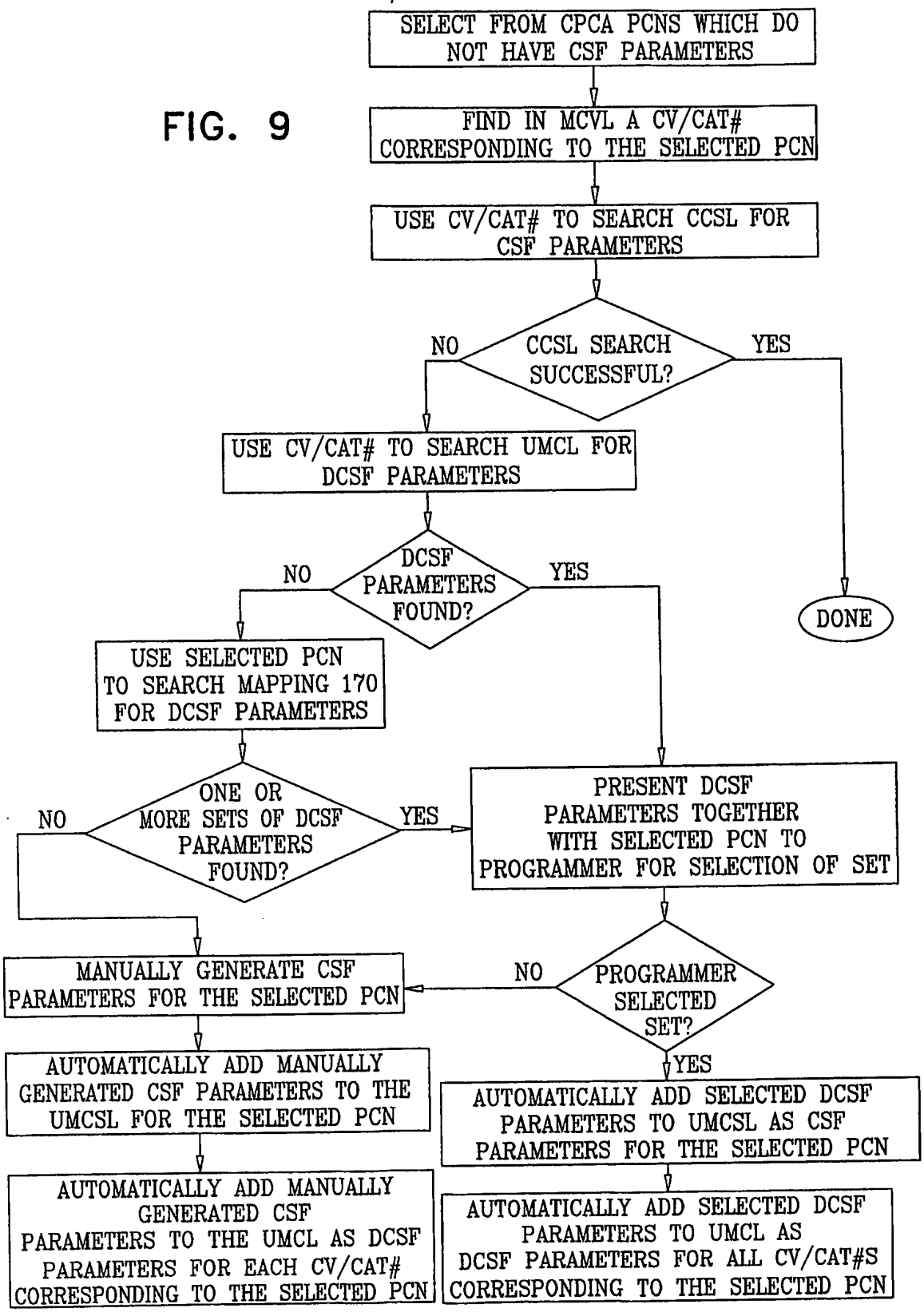
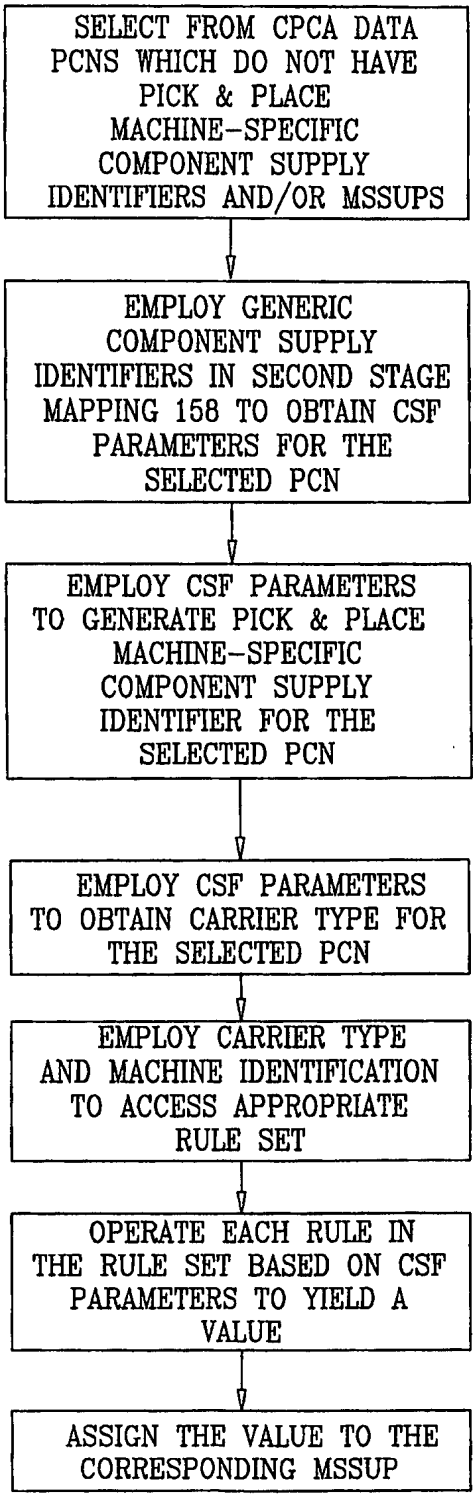

SELECT FROM CPCA PCNS WHICH DO NOT HAVE CSF PARAMETERS
FIND IN MCVL A CV/CAT# CORRESPONDING TO THE SELECTED PCN
USE CV/CAT# TO SEARCH CCSL FOR CSF PARAMETERS
CCSL SEARCH SUCCESSFUL?
NO
YES
DONE
USE CV/CAT# TO SEARCH UMCL FOR DCSF PARAMETERS
DCSF PARAMETERS FOUND?
NO
YES
USE SELECTED PCN TO SEARCH MAPPING 170 FOR DCSF PARAMETERS
ONE OR MORE SETS OF DCSF PARAMETERS FOUND?
NO
YES
PRESENT DCSF PARAMETERS TOGETHER WITH SELECTED PCN TO PROGRAMMER FOR SELECTION OF SET
PROGRAMMER SELECTED SET?
NO
YES
MANUALLY GENERATE CSF PARAMETERS FOR THE SELECTED PCN
AUTOMATICALLY ADD MANUALLY GENERATED CSF PARAMETERS TO THE UMCSL FOR THE SELECTED PCN
AUTOMATICALLY ADD MANUALLY GENERATED CSF PARAMETERS TO THE UMCL AS DCSF PARAMETERS FOR EACH CV/CAT# CORRESPONDING TO THE SELECTED PCN
AUTOMATICALLY ADD SELECTED DCSF PARAMETERS TO UMCSL AS CSF PARAMETERS FOR THE SELECTED PCN
AUTOMATICALLY ADD SELECTED DCSF PARAMETERS TO UMCL AS DCSF PARAMETERS FOR ALL CV/CAT#S CORRESPONDING TO THE SELECTED PCN

FIG. 10


SELECT FROM CPCA DATA PCNS WHICH DO NOT HAVE PICK & PLACE MACHINE-SPECIFIC COMPONENT SUPPLY IDENTIFIERS AND/OR MSSUPS
EMPLOY GENERIC COMPONENT SUPPLY IDENTIFIERS IN SECOND STAGE MAPPING 158 TO OBTAIN CSF PARAMETERS FOR THE SELECTED PCN
EMPLOY CSF PARAMETERS TO GENERATE PICK & PLACE MACHINE-SPECIFIC COMPONENT SUPPLY IDENTIFIER FOR THE SELECTED PCN
EMPLOY CSF PARAMETERS TO OBTAIN CARRIER TYPE FOR THE SELECTED PCN
EMPLOY CARRIER TYPE AND MACHINE IDENTIFICATION TO ACCESS APPROPRIATE RULE SET
OPERATE EACH RULE IN THE RULE SET BASED ON CSF PARAMETERS TO YIELD A VALUE
ASSIGN THE VALUE TO THE CORRESPONDING MSSUP

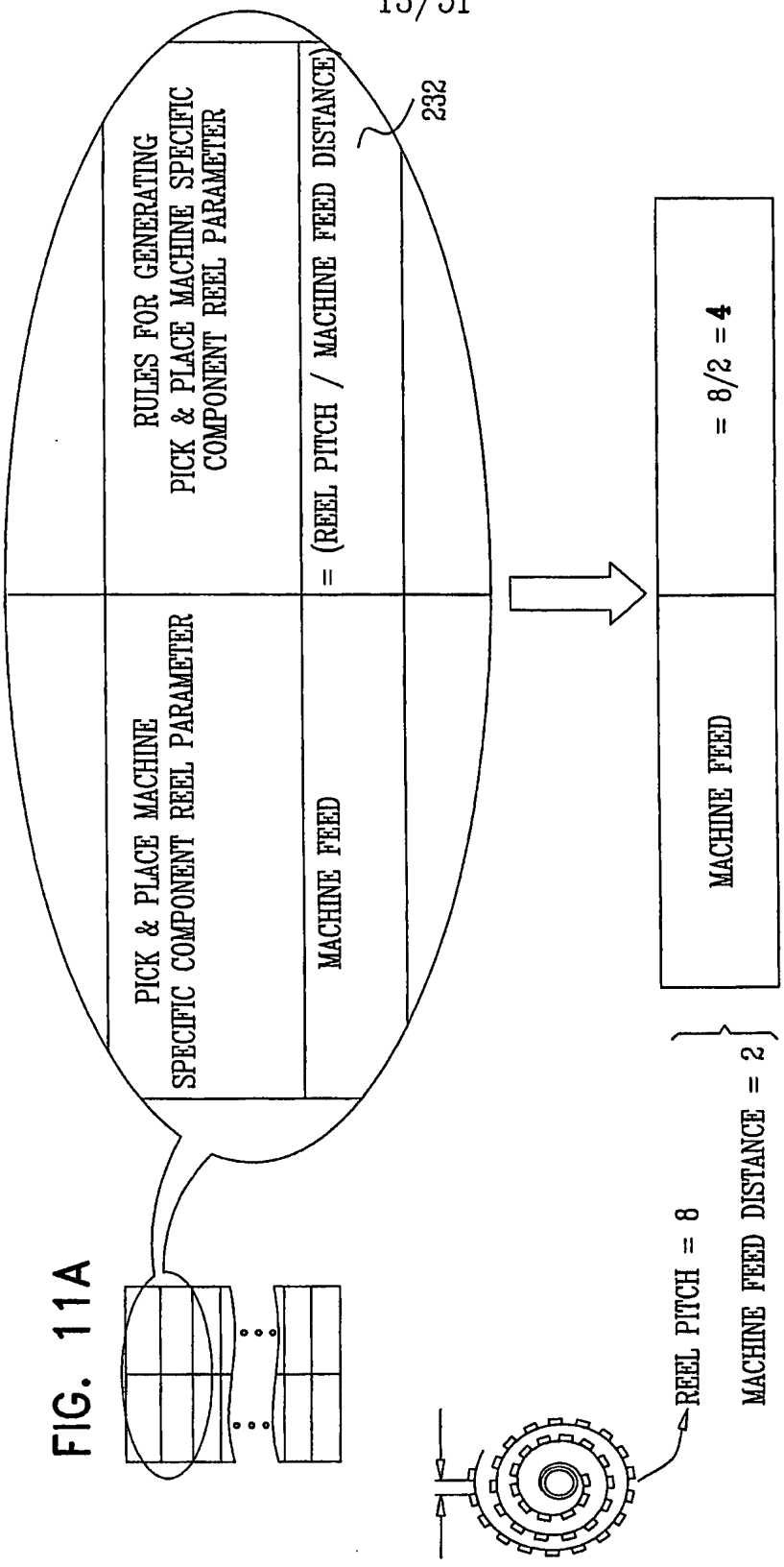

RULES FOR GENERATING
PICK & PLACE MACHINE SPECIFIC
COMPONENT REEL PARAMETER
= (REEL PITCH / MACHINE FEED DISTANCE)
232
PICK & PLACE MACHINE
SPECIFIC COMPONENT REEL PARAMETER
MACHINE FEED
= 8/2 = 4
MACHINE FEED
REEL PITCH = 8
MACHINE FEED DISTANCE = 2

FIG. 11A

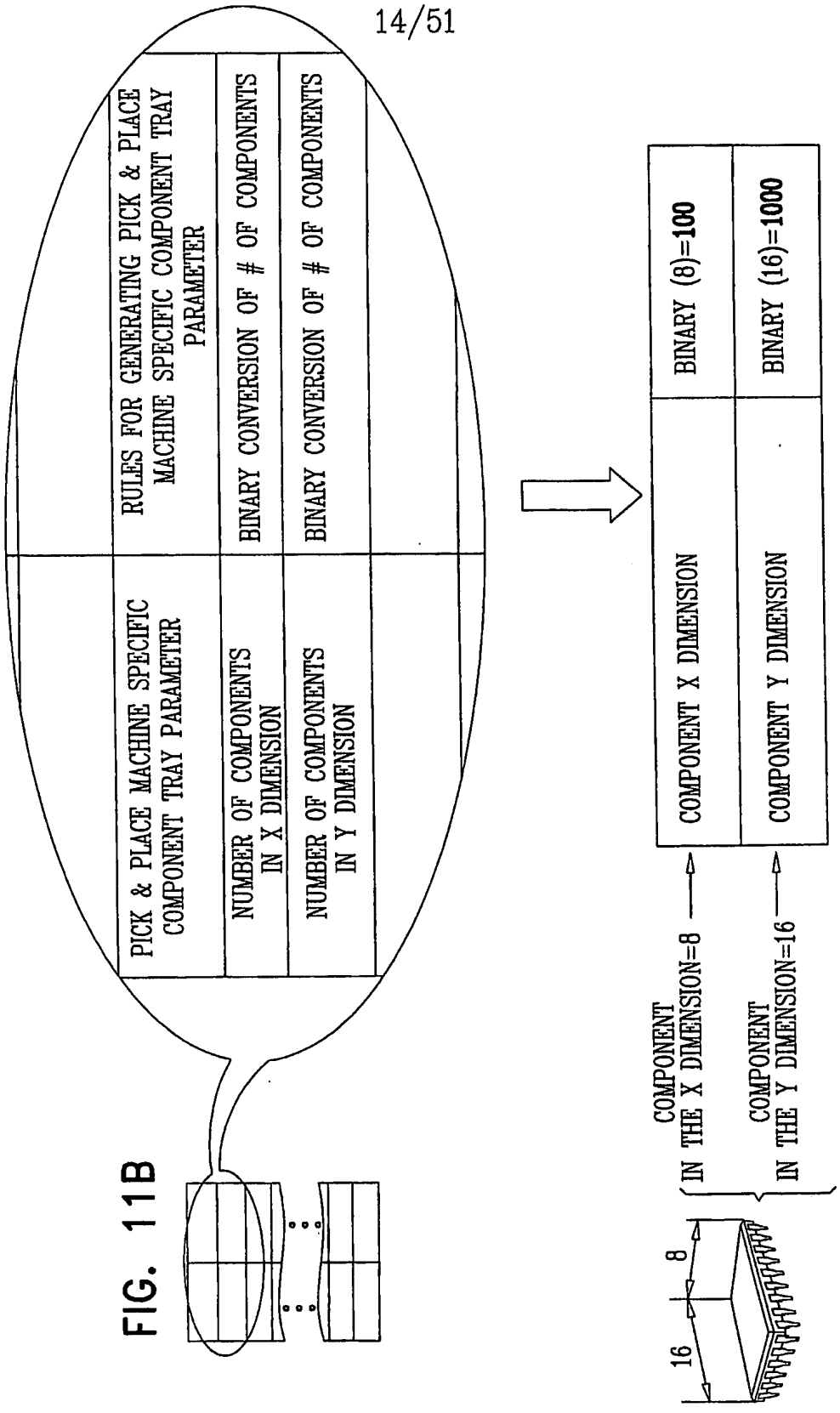

PICK & PLACE MACHINE SPECIFIC COMPONENT TRAY PARAMETER
RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT TRAY PARAMETER
NUMBER OF COMPONENTS IN X DIMENSION
BINARY CONVERSION OF # OF COMPONENTS
NUMBER OF COMPONENTS IN Y DIMENSION
BINARY CONVERSION OF # OF COMPONENTS
COMPONENT X DIMENSION
BINARY (8)=100
COMPONENT Y DIMENSION
BINARY (16)=1000
COMPONENT IN THE X DIMENSION=8
COMPONENT IN THE Y DIMENSION=16
16
8

FIG. 11B

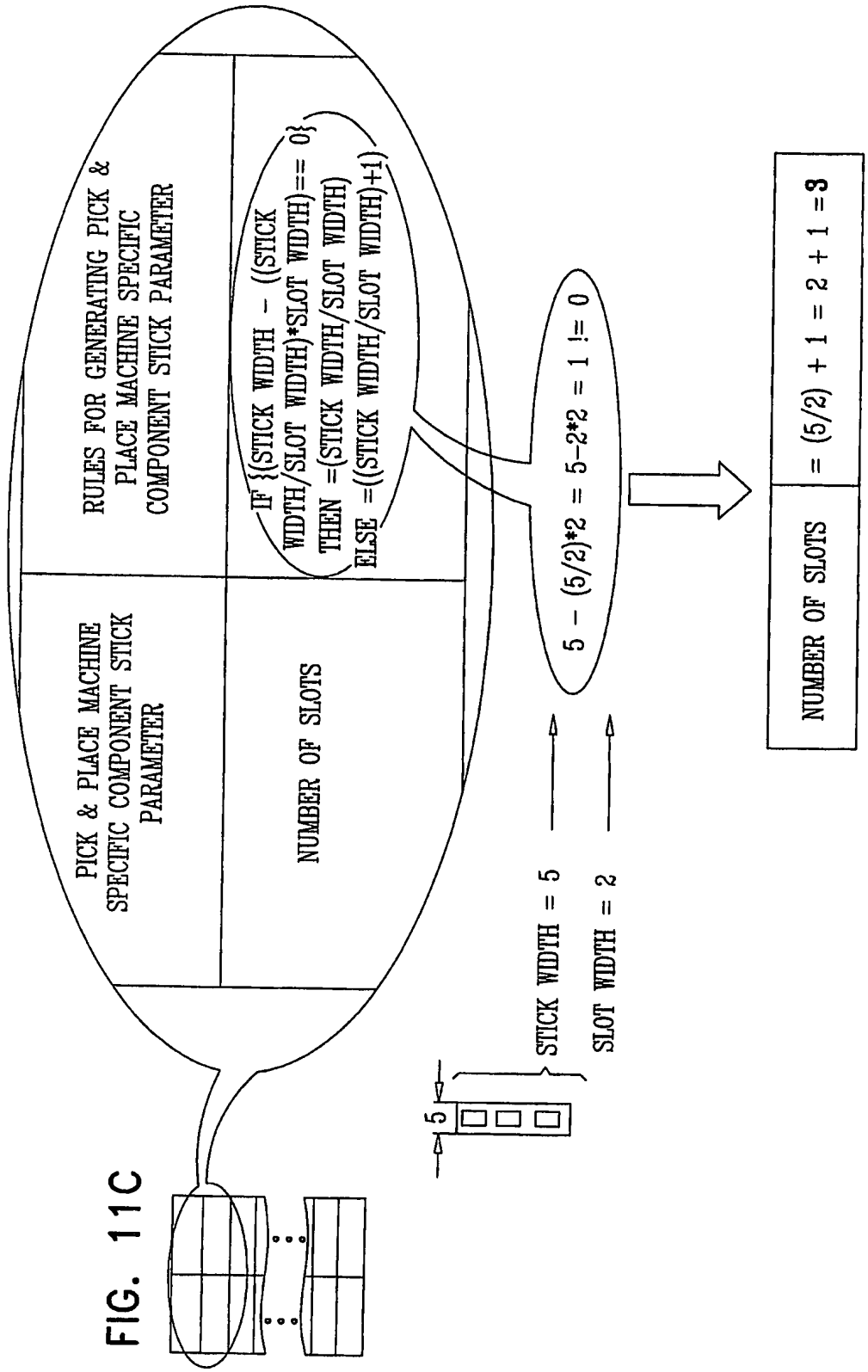

RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT STICK PARAMETER
IF {(STICK WIDTH - ((STICK WIDTH/SLOT WIDTH)*SLOT WIDTH)== 0}
THEN =(STICK WIDTH/SLOT WIDTH)
ELSE =((STICK WIDTH/SLOT WIDTH)+1)
PICK & PLACE MACHINE SPECIFIC COMPONENT STICK PARAMETER
NUMBER OF SLOTS
5 - (5/2)*2 = 5-2*2 = 1 != 0
= (5/2) + 1 = 2 + 1 = 3
NUMBER OF SLOTS
STICK WIDTH = 5
SLOT WIDTH = 2
5

FIG. 11C

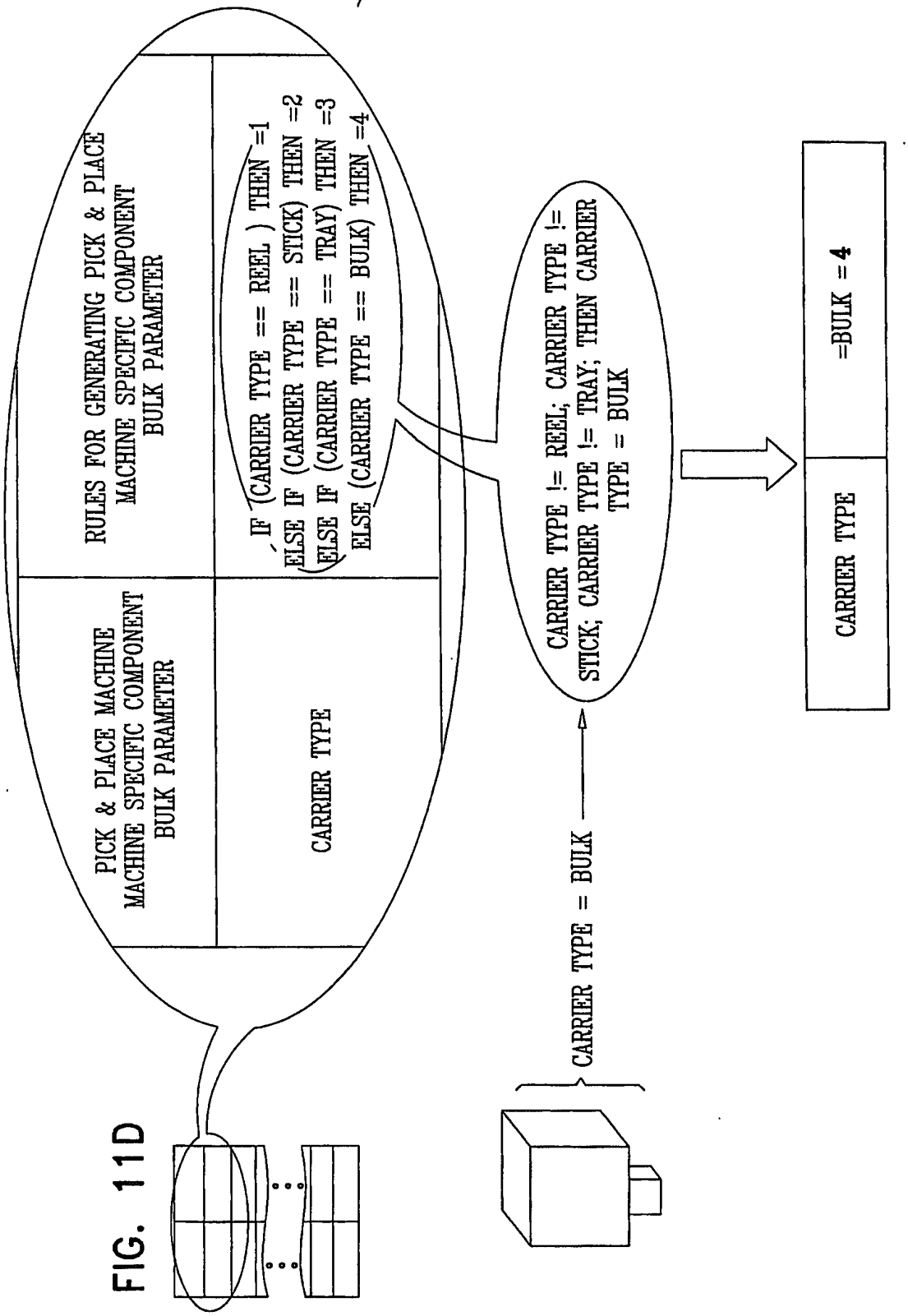

RULES FOR GENERATING PICK & PLACE
MACHINE SPECIFIC COMPONENT
BULK PARAMETER
IF (CARRIER TYPE == REEL) THEN =1
ELSE IF (CARRIER TYPE == STICK) THEN =2
ELSE IF (CARRIER TYPE == TRAY) THEN =3
ELSE (CARRIER TYPE == BULK) THEN =4
PICK & PLACE MACHINE
MACHINE SPECIFIC COMPONENT
BULK PARAMETER
CARRIER TYPE
CARRIER TYPE != REEL; CARRIER TYPE != STICK; CARRIER TYPE != TRAY; THEN CARRIER TYPE = BULK
CARRIER TYPE
=BULK = 4
CARRIER TYPE = BULK

FIG. 11D

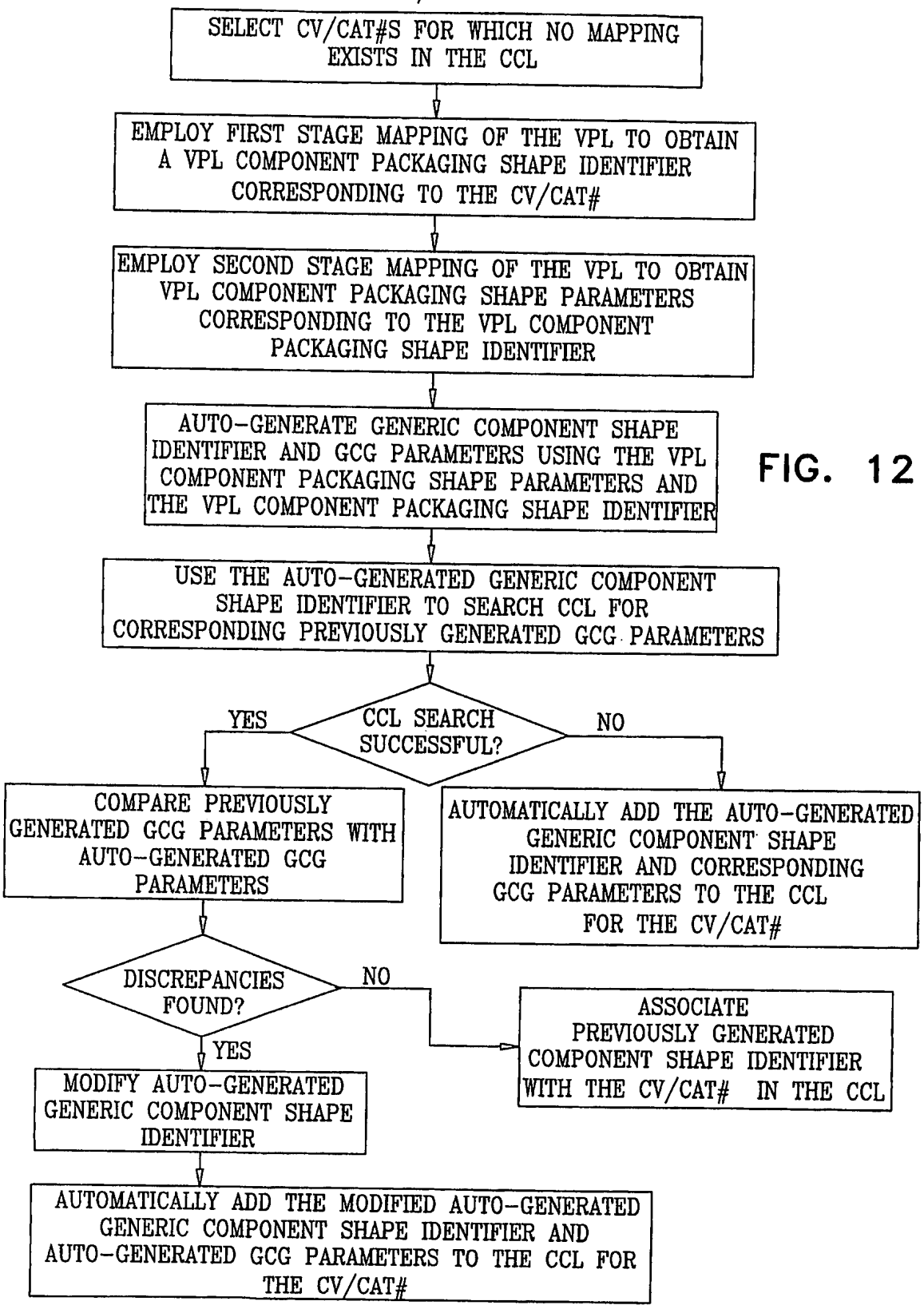
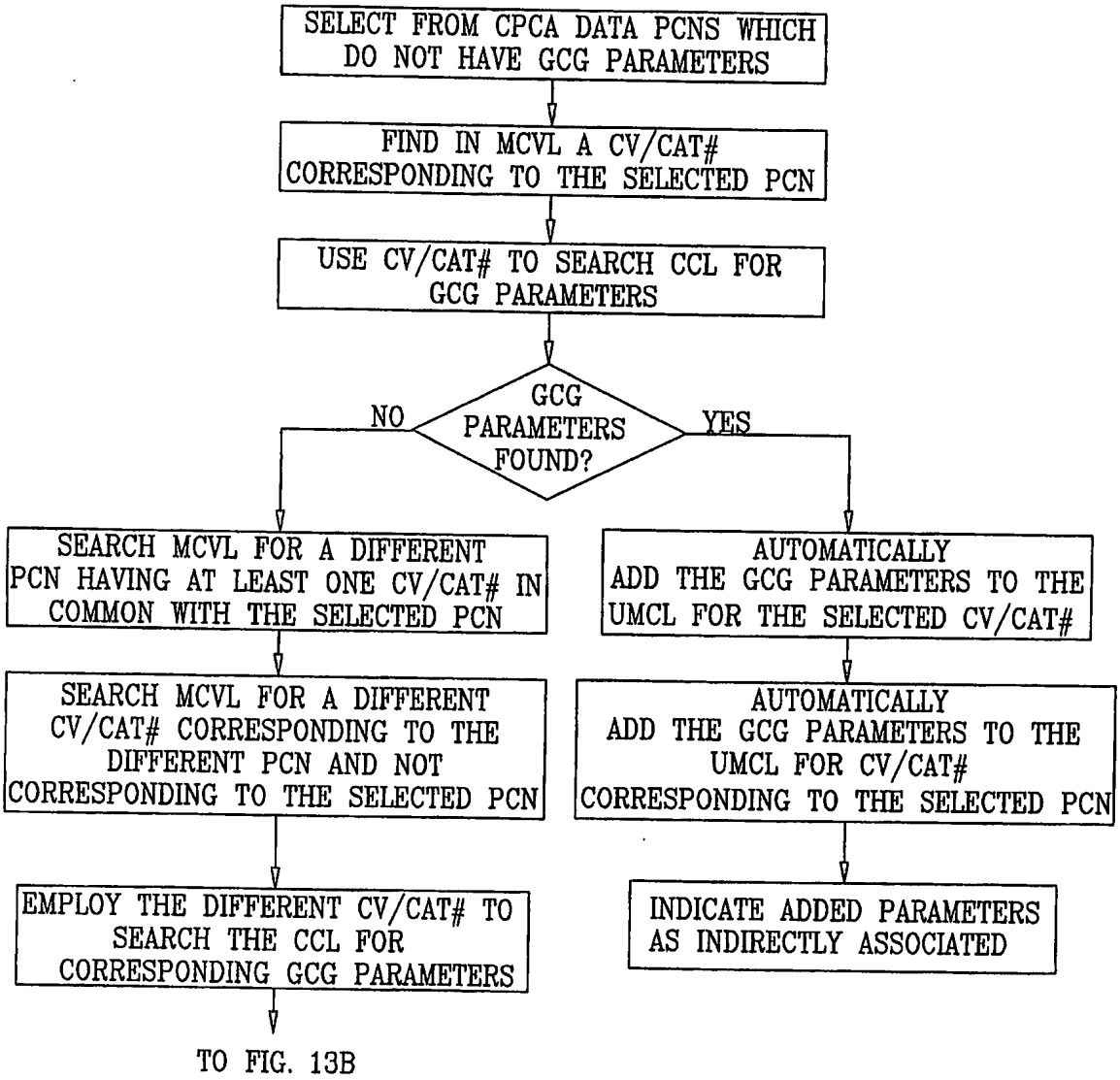

SELECT CV/CAT#S FOR WHICH NO MAPPING EXISTS IN THE CCL
EMPLOY FIRST STAGE MAPPING OF THE VPL TO OBTAIN A VPL COMPONENT PACKAGING SHAPE IDENTIFIER CORRESPONDING TO THE CV/CAT#
EMPLOY SECOND STAGE MAPPING OF THE VPL TO OBTAIN VPL COMPONENT PACKAGING SHAPE PARAMETERS CORRESPONDING TO THE VPL COMPONENT PACKAGING SHAPE IDENTIFIER
AUTO-GENERATE GENERIC COMPONENT SHAPE IDENTIFIER AND GCG PARAMETERS USING THE VPL COMPONENT PACKAGING SHAPE PARAMETERS AND THE VPL COMPONENT PACKAGING SHAPE IDENTIFIER
USE THE AUTO-GENERATED GENERIC COMPONENT SHAPE IDENTIFIER TO SEARCH CCL FOR CORRESPONDING PREVIOUSLY GENERATED GCG PARAMETERS
CCL SEARCH SUCCESSFUL?
YES
NO
COMPARE PREVIOUSLY GENERATED GCG PARAMETERS WITH AUTO-GENERATED GCG PARAMETERS
AUTOMATICALLY ADD THE AUTO-GENERATED GENERIC COMPONENT SHAPE IDENTIFIER AND CORRESPONDING GCG PARAMETERS TO THE CCL FOR THE CV/CAT#
DISCREPANCIES FOUND?
NO
YES
ASSOCIATE PREVIOUSLY GENERATED COMPONENT SHAPE IDENTIFIER WITH THE CV/CAT# IN THE CCL
MODIFY AUTO-GENERATED GENERIC COMPONENT SHAPE IDENTIFIER
AUTOMATICALLY ADD THE MODIFIED AUTO-GENERATED GENERIC COMPONENT SHAPE IDENTIFIER AND AUTO-GENERATED GCG PARAMETERS TO THE CCL FOR THE CV/CAT#

FIG. 12

FIG. 13A


SELECT FROM CPCA DATA PCNS WHICH DO NOT HAVE GCG PARAMETERS
FIND IN MCVL A CV/CAT# CORRESPONDING TO THE SELECTED PCN
USE CV/CAT# TO SEARCH CCL FOR GCG PARAMETERS
GCG PARAMETERS FOUND?
NO
YES
SEARCH MCVL FOR A DIFFERENT PCN HAVING AT LEAST ONE CV/CAT# IN COMMON WITH THE SELECTED PCN
SEARCH MCVL FOR A DIFFERENT CV/CAT# CORRESPONDING TO THE DIFFERENT PCN AND NOT CORRESPONDING TO THE SELECTED PCN
EMPLOY THE DIFFERENT CV/CAT# TO SEARCH THE CCL FOR CORRESPONDING GCG PARAMETERS
AUTOMATICALLY ADD THE GCG PARAMETERS TO THE UMCL FOR THE SELECTED CV/CAT#
AUTOMATICALLY ADD THE GCG PARAMETERS TO THE UMCL FOR CV/CAT# CORRESPONDING TO THE SELECTED PCN
INDICATE ADDED PARAMETERS AS INDIRECTLY ASSOCIATED
TO FIG. 13B

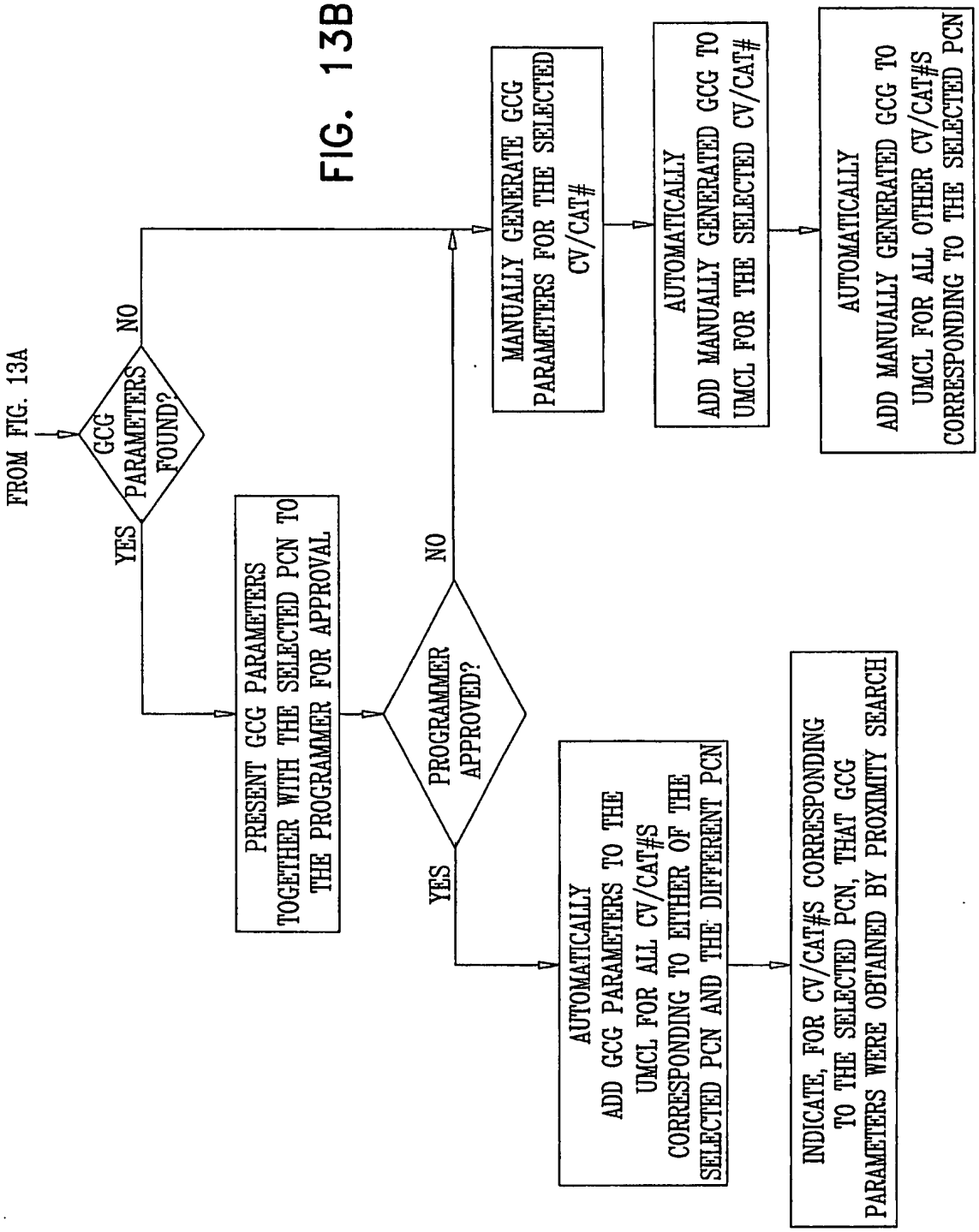
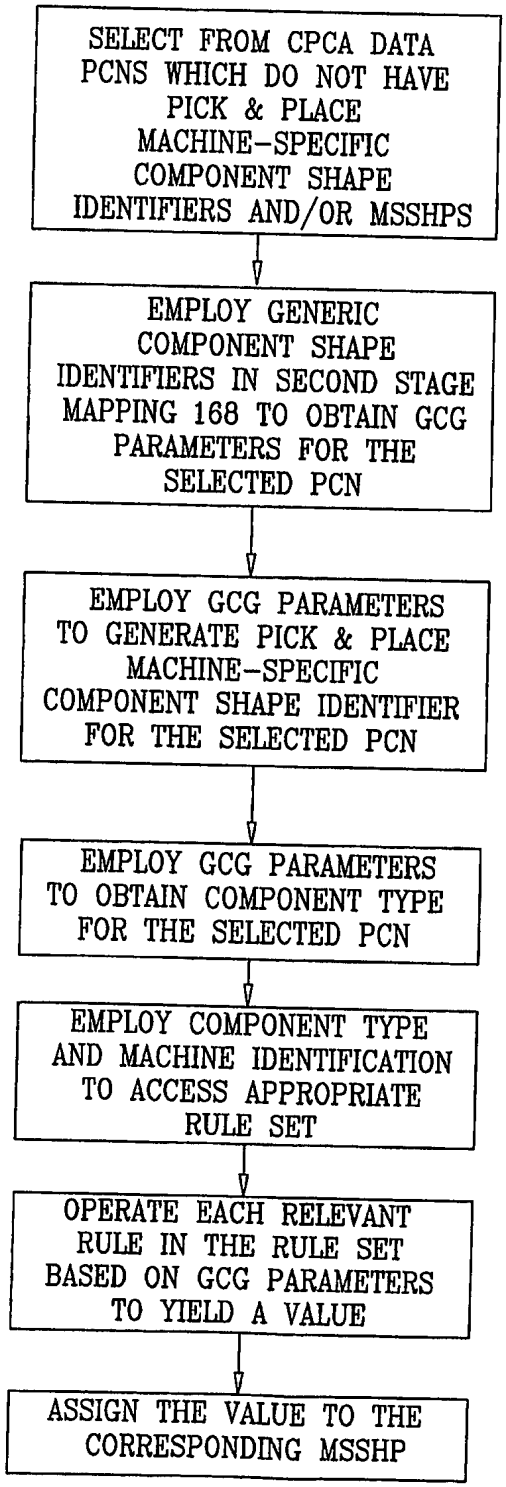

FROM FIG. 13A
GCG PARAMETERS FOUND?
NO
YES
MANUALLY GENERATE GCG PARAMETERS FOR THE SELECTED CV/CAT#
AUTOMATICALLY ADD MANUALLY GENERATED GCG TO UMCL FOR THE SELECTED CV/CAT#
AUTOMATICALLY ADD MANUALLY GENERATED GCG TO UMCL FOR ALL OTHER CV/CAT#S CORRESPONDING TO THE SELECTED PCN
PRESENT GCG PARAMETERS TOGETHER WITH THE SELECTED PCN TO THE PROGRAMMER FOR APPROVAL
PROGRAMMER APPROVED?
NO
YES
AUTOMATICALLY ADD GCG PARAMETERS TO THE UMCL FOR ALL CV/CAT#S CORRESPONDING TO EITHER OF THE SELECTED PCN AND THE DIFFERENT PCN
INDICATE, FOR CV/CAT#S CORRESPONDING TO THE SELECTED PCN, THAT GCG PARAMETERS WERE OBTAINED BY PROXIMITY SEARCH

FIG. 13B

FIG. 14


SELECT FROM CPCA DATA PCNS WHICH DO NOT HAVE PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE IDENTIFIERS AND/OR MSSHPS
EMPLOY GENERIC COMPONENT SHAPE IDENTIFIERS IN SECOND STAGE MAPPING 168 TO OBTAIN GCG PARAMETERS FOR THE SELECTED PCN
EMPLOY GCG PARAMETERS TO GENERATE PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE IDENTIFIER FOR THE SELECTED PCN
EMPLOY GCG PARAMETERS TO OBTAIN COMPONENT TYPE FOR THE SELECTED PCN
EMPLOY COMPONENT TYPE AND MACHINE IDENTIFICATION TO ACCESS APPROPRIATE RULE SET
OPERATE EACH RELEVANT RULE IN THE RULE SET BASED ON GCG PARAMETERS TO YIELD A VALUE
ASSIGN THE VALUE TO THE CORRESPONDING MSSHP

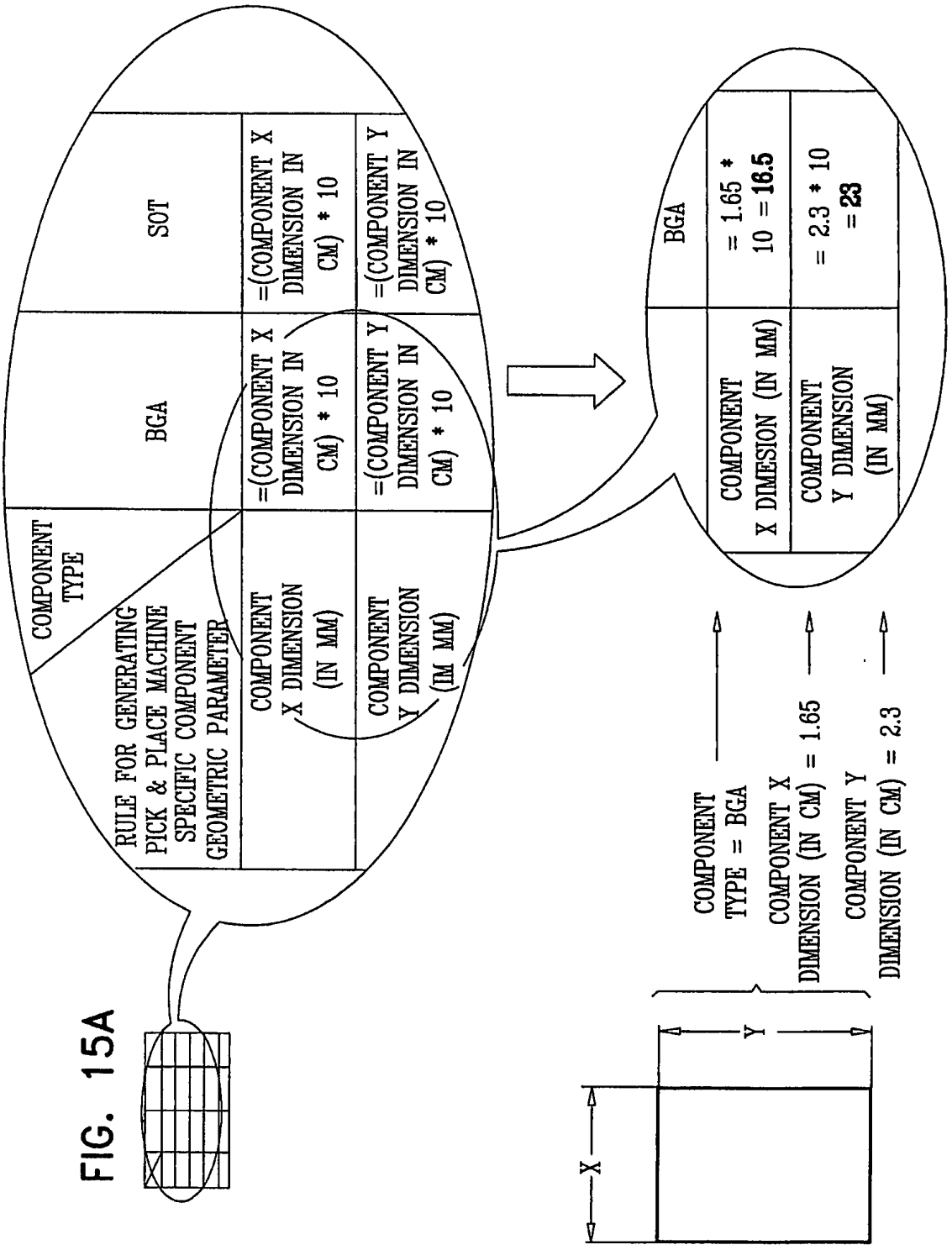

COMPONENT TYPE
RULE FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT GEOMETRIC PARAMETER
BGA
SOT
COMPONENT X DIMENSION (IN MM)
COMPONENT Y DIMENSION (IM MM)
=(COMPONENT X DIMENSION IN CM) * 10
=(COMPONENT Y DIMENSION IN CM) * 10
=(COMPONENT X DIMENSION IN CM) * 10
=(COMPONENT Y DIMENSION IN CM) * 10
BGA
COMPONENT X DIMESION (IN MM)
COMPONENT Y DIMENSION (IN MM)
= 1.65 * 10 = 16.5
= 2.3 * 10 = 23
COMPONENT TYPE = BGA
COMPONENT X DIMENSION (IN CM) = 1.65
COMPONENT Y DIMENSION (IN CM) = 2.3
X
Y

FIG. 15A

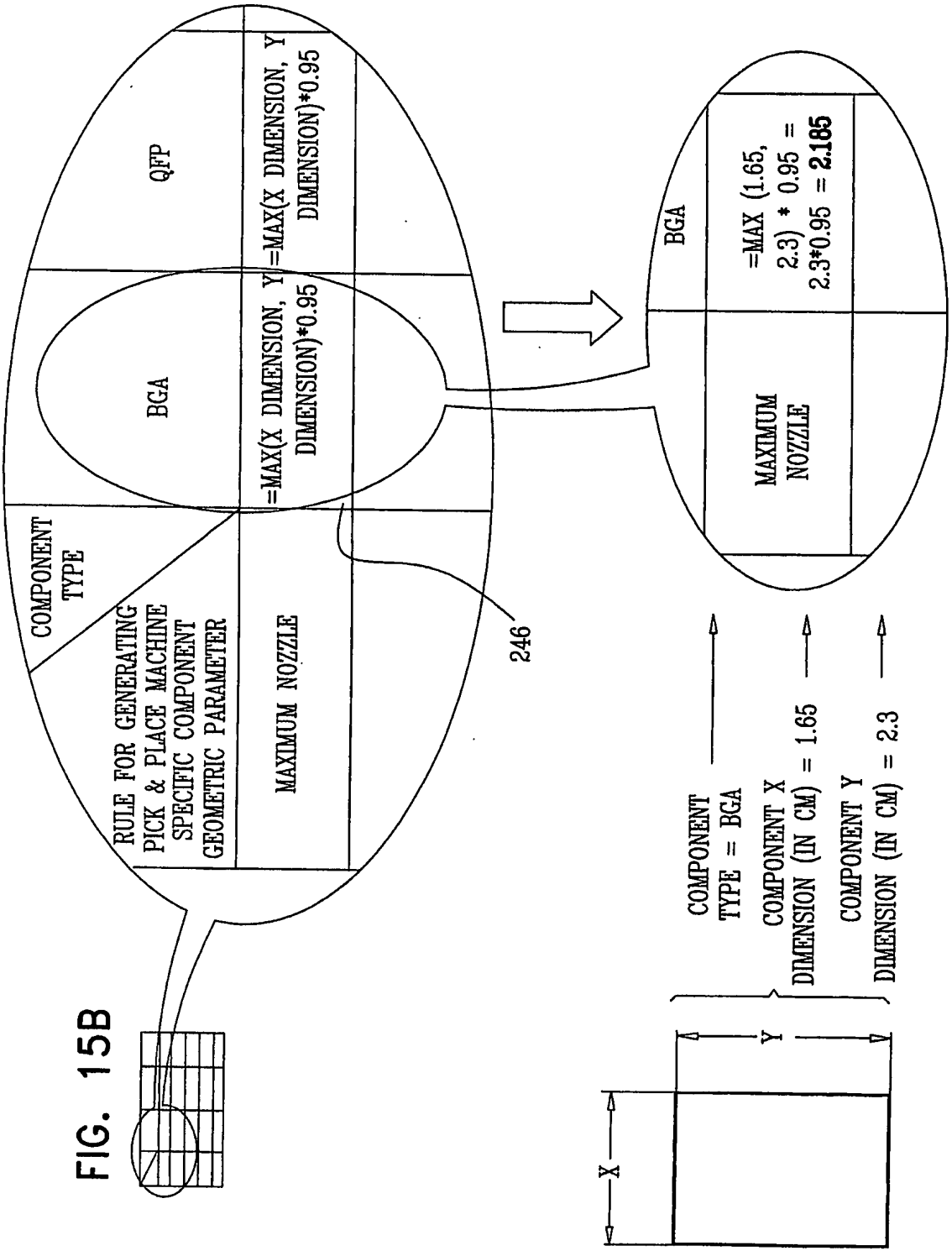

COMPONENT TYPE
RULE FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT GEOMETRIC PARAMETER
MAXIMUM NOZZLE
QFP
BGA
=MAX(X DIMENSION, Y DIMENSION)*0.95
=MAX(X DIMENSION, Y DIMENSION)*0.95
246
BGA
MAXIMUM NOZZLE
=MAX (1.65, 2.3) * 0.95 = 2.3*0.95 = 2.185
COMPONENT TYPE = BGA
COMPONENT X DIMENSION (IN CM) = 1.65
COMPONENT Y DIMENSION (IN CM) = 2.3
X
Y

FIG. 15B

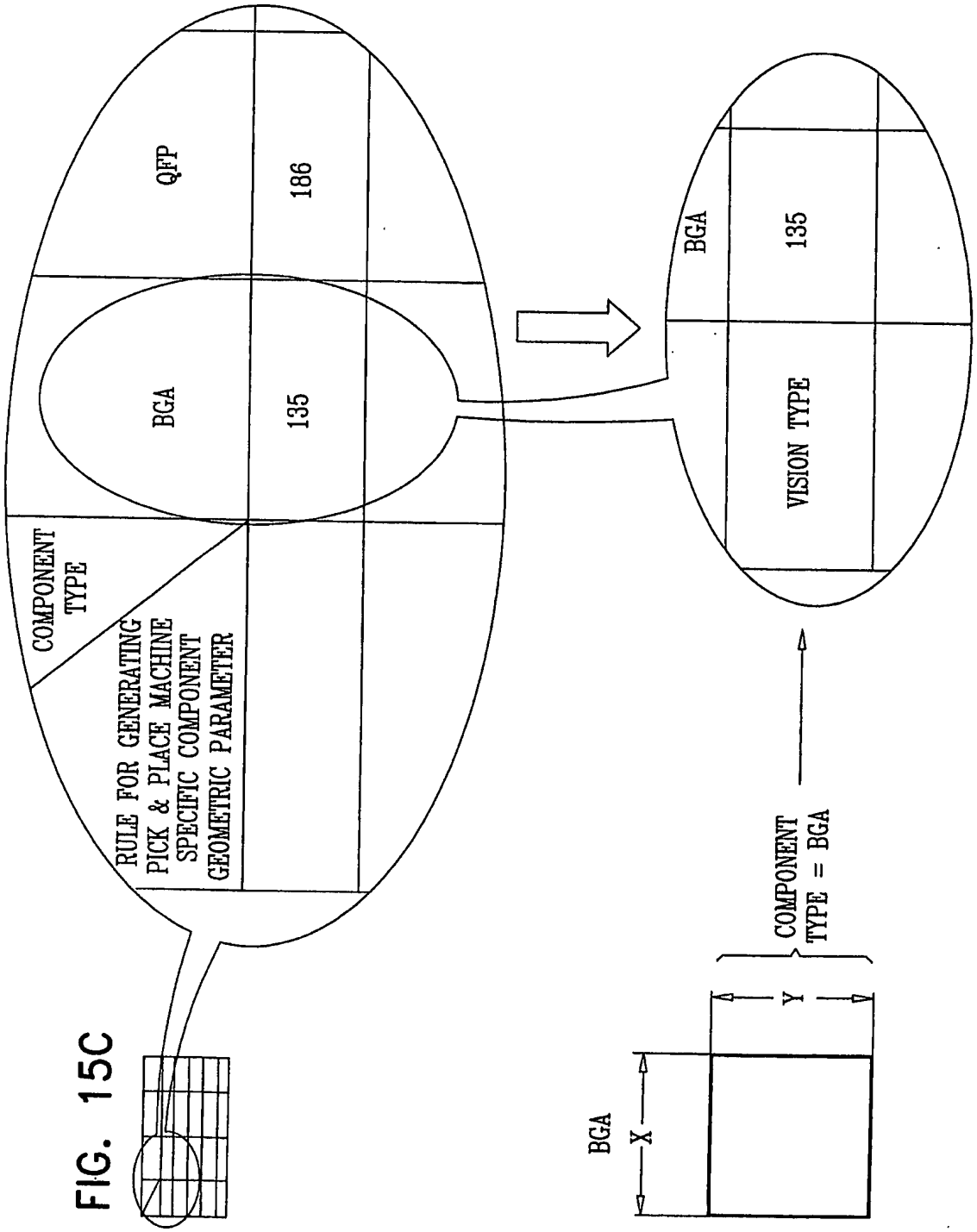

COMPONENT TYPE
RULE FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT GEOMETRIC PARAMETER
QFP
186
BGA
135
BGA
135
VISION TYPE
COMPONENT TYPE = BGA
Y
BGA
X

FIG. 15C

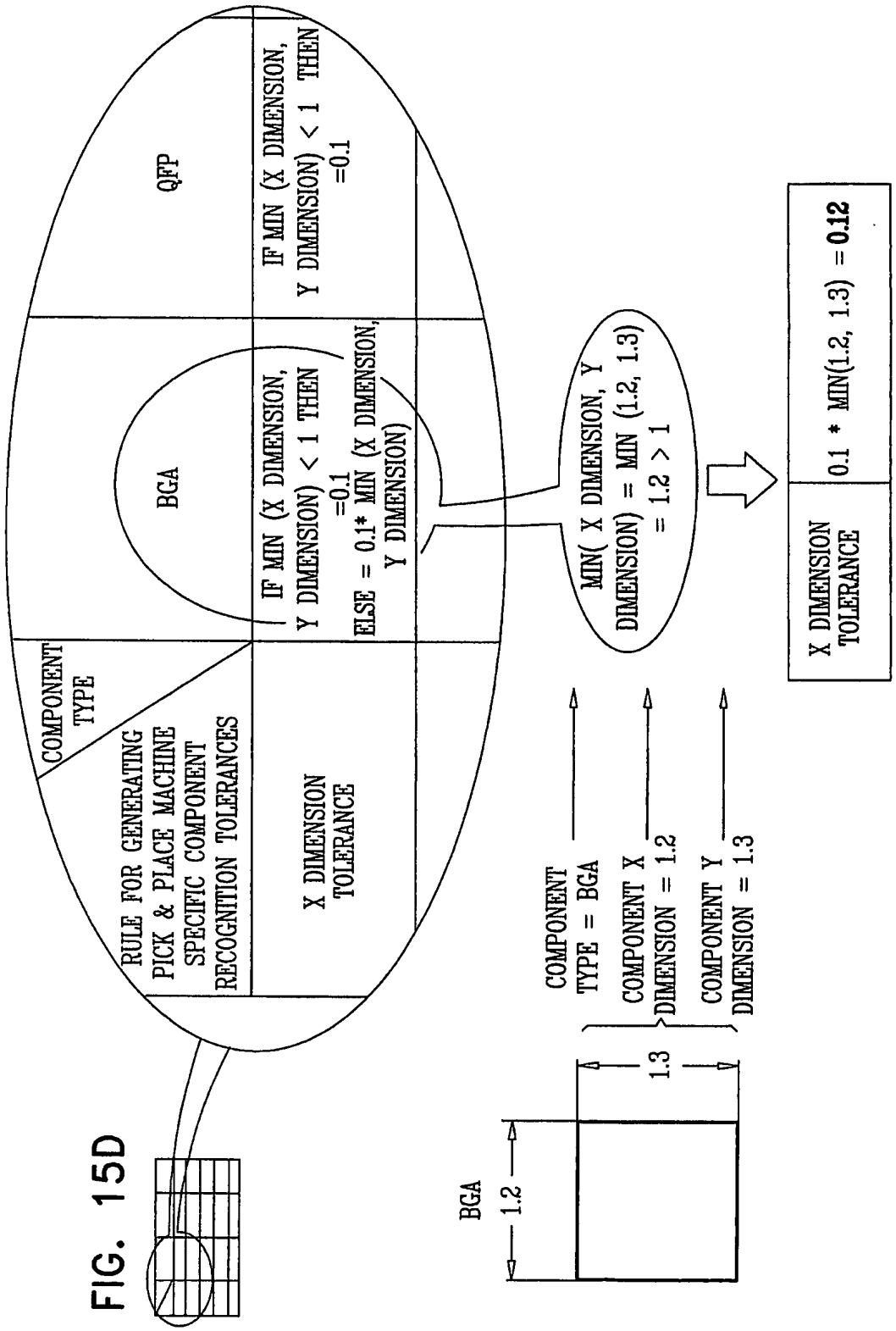

RULE FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT RECOGNITION TOLERANCES
COMPONENT TYPE
X DIMENSION TOLERANCE
BGA
QFP
IF MIN (X DIMENSION, Y DIMENSION) < 1 THEN =0.1
ELSE = 0.1* MIN (X DIMENSION, Y DIMENSION)
IF MIN (X DIMENSION, Y DIMENSION) < 1 THEN =0.1
MIN(X DIMENSION, Y DIMENSION) = MIN (1.2, 1.3) = 1.2 > 1
X DIMENSION TOLERANCE
0.1 * MIN(1.2, 1.3) = 0.12
COMPONENT TYPE = BGA
COMPONENT X DIMENSION = 1.2
COMPONENT Y DIMENSION = 1.3
BGA
1.2
1.3

FIG. 15D

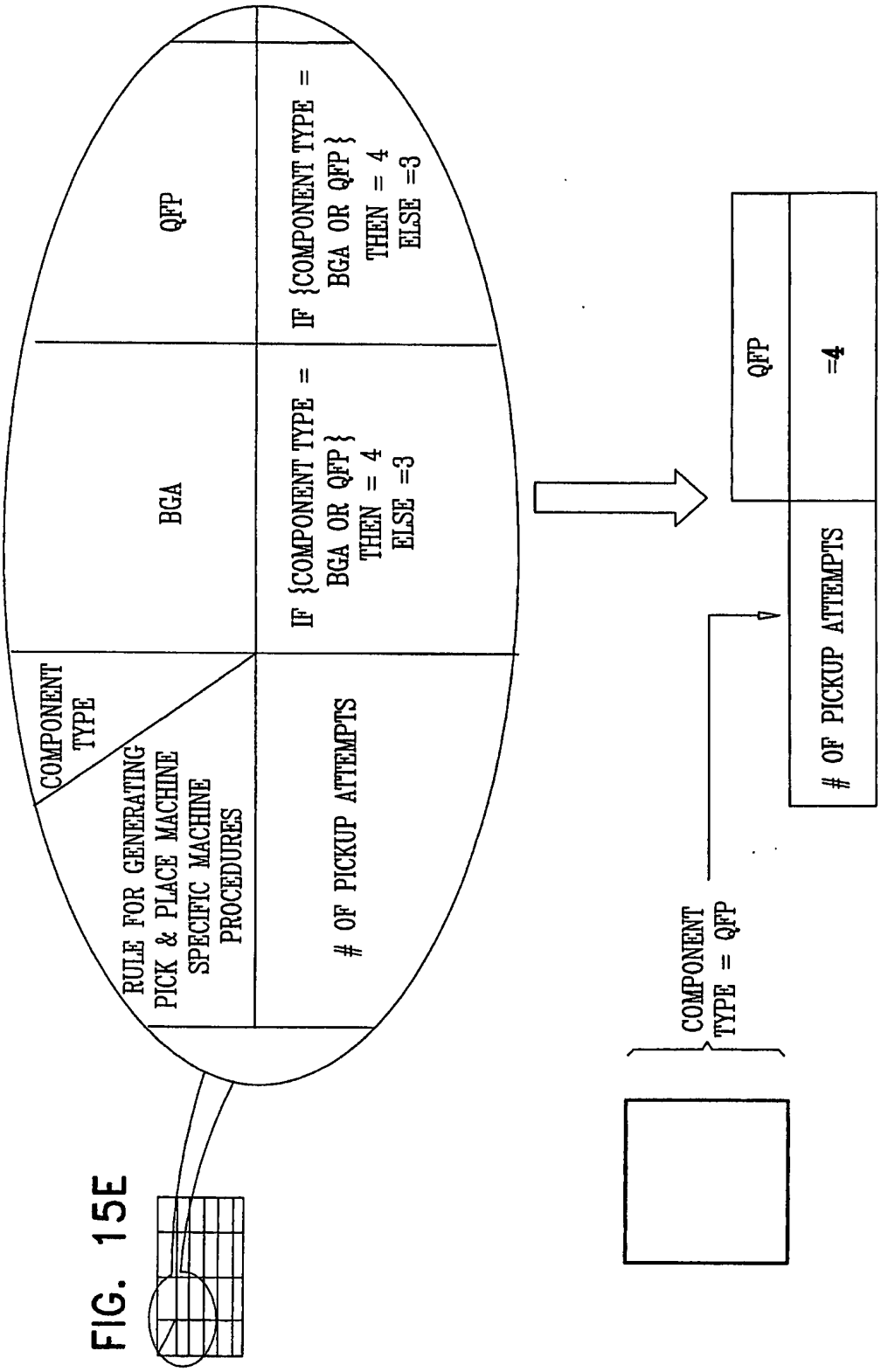

COMPONENT TYPE
RULE FOR GENERATING PICK & PLACE MACHINE SPECIFIC MACHINE PROCEDURES
OF PICKUP ATTEMPTS
BGA
IF {COMPONENT TYPE = BGA OR QFP} THEN = 4 ELSE =3
QFP
IF {COMPONENT TYPE = BGA OR QFP} THEN = 4 ELSE =3
COMPONENT TYPE = QFP
QFP
=4
OF PICKUP ATTEMPTS

FIG. 15E

FIG. 16

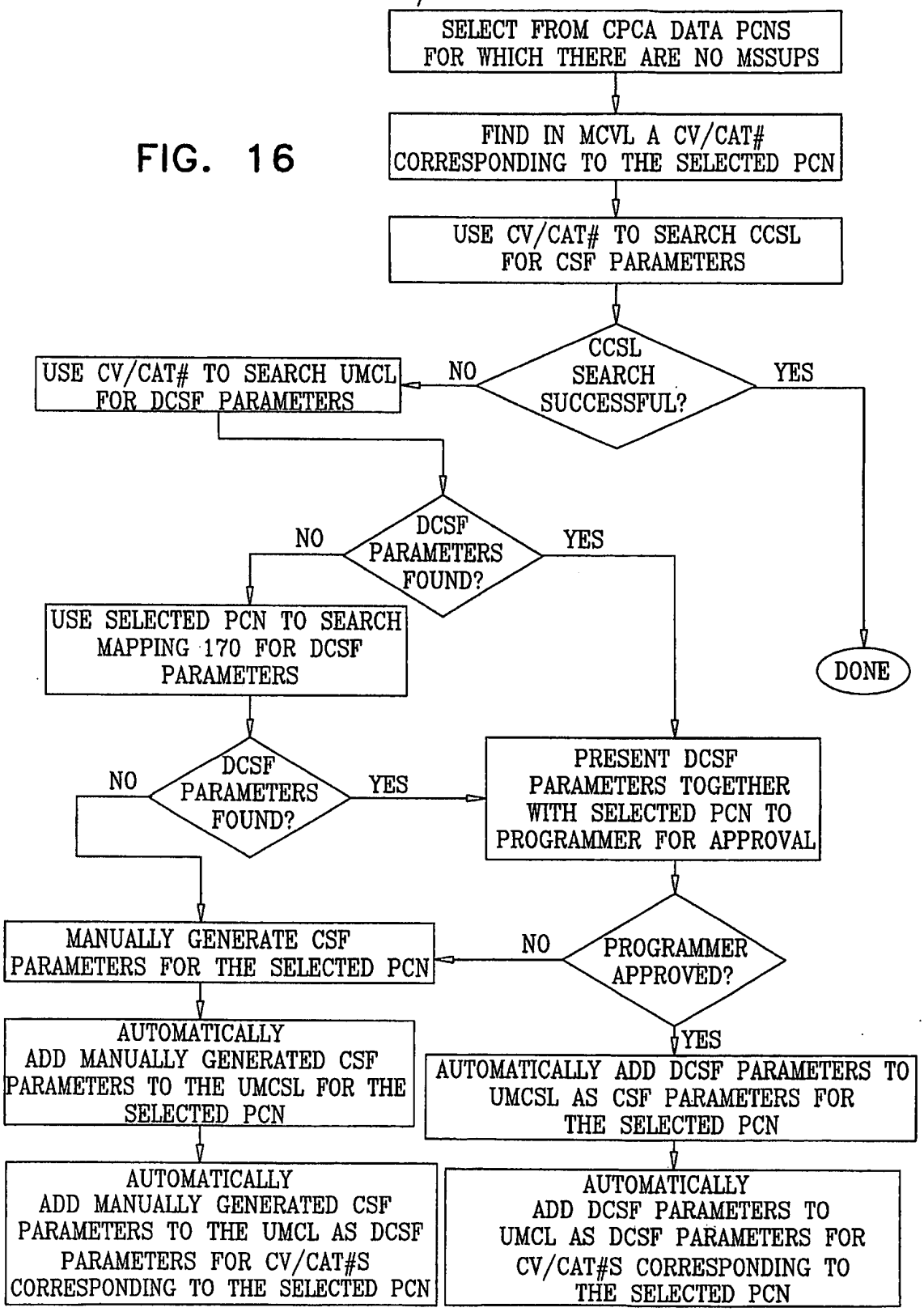
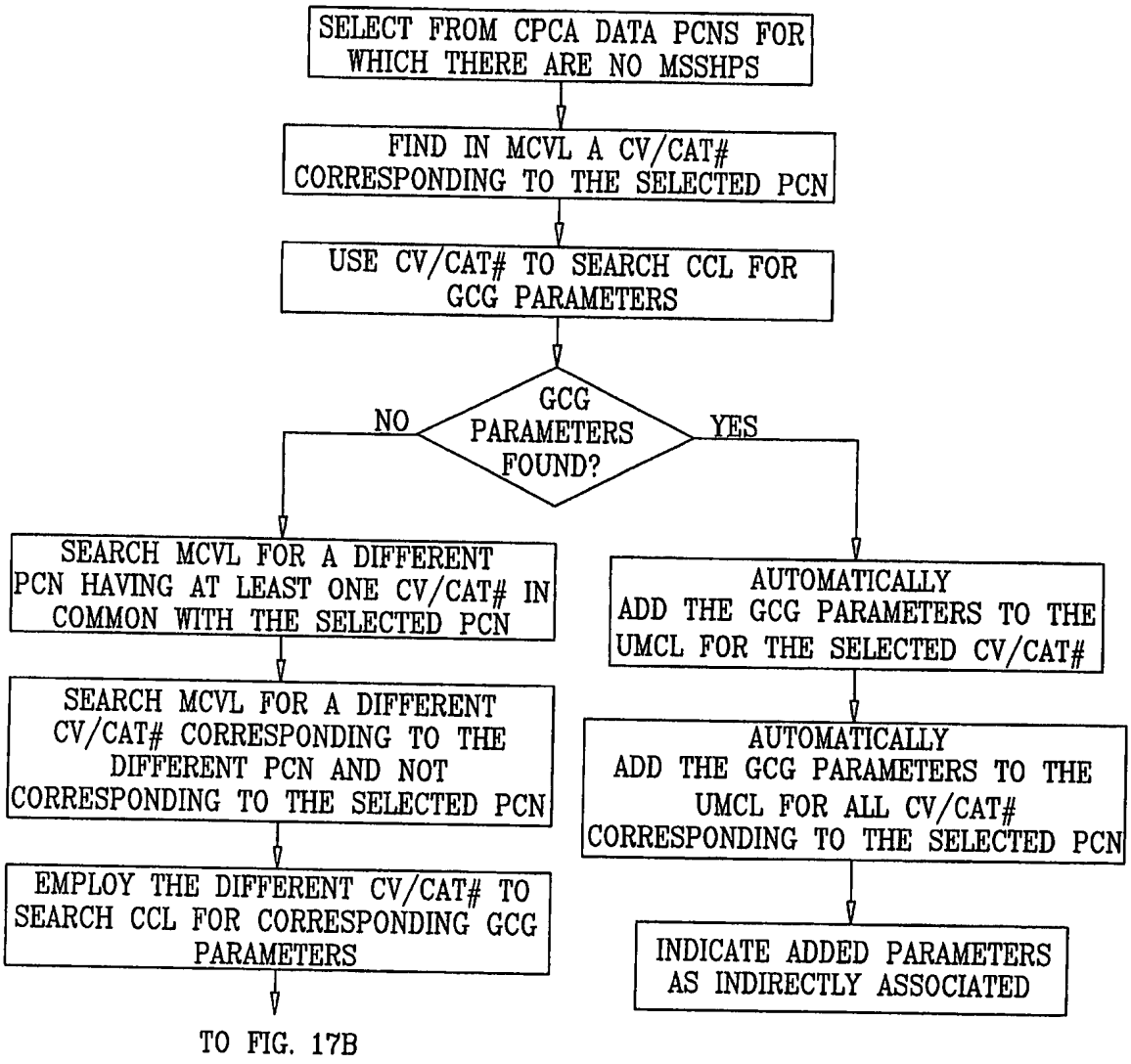

SELECT FROM CPCA DATA PCNS FOR WHICH THERE ARE NO MSSUPS
FIND IN MCVL A CV/CAT# CORRESPONDING TO THE SELECTED PCN
USE CV/CAT# TO SEARCH CCSL FOR CSF PARAMETERS
CCSL SEARCH SUCCESSFUL?
NO
YES
USE CV/CAT# TO SEARCH UMCL FOR DCSF PARAMETERS
DCSF PARAMETERS FOUND?
NO
YES
USE SELECTED PCN TO SEARCH MAPPING 170 FOR DCSF PARAMETERS
DONE
DCSF PARAMETERS FOUND?
NO
YES
PRESENT DCSF PARAMETERS TOGETHER WITH SELECTED PCN TO PROGRAMMER FOR APPROVAL
MANUALLY GENERATE CSF PARAMETERS FOR THE SELECTED PCN
NO
PROGRAMMER APPROVED?
YES
AUTOMATICALLY ADD MANUALLY GENERATED CSF PARAMETERS TO THE UMCSL FOR THE SELECTED PCN
AUTOMATICALLY ADD DCSF PARAMETERS TO UMCSL AS CSF PARAMETERS FOR THE SELECTED PCN
AUTOMATICALLY ADD MANUALLY GENERATED CSF PARAMETERS TO THE UMCL AS DCSF PARAMETERS FOR CV/CAT#S CORRESPONDING TO THE SELECTED PCN
AUTOMATICALLY ADD DCSF PARAMETERS TO UMCL AS DCSF PARAMETERS FOR CV/CAT#S CORRESPONDING TO THE SELECTED PCN

FIG. 17A



TO FIG. 17B

FIG. 17B

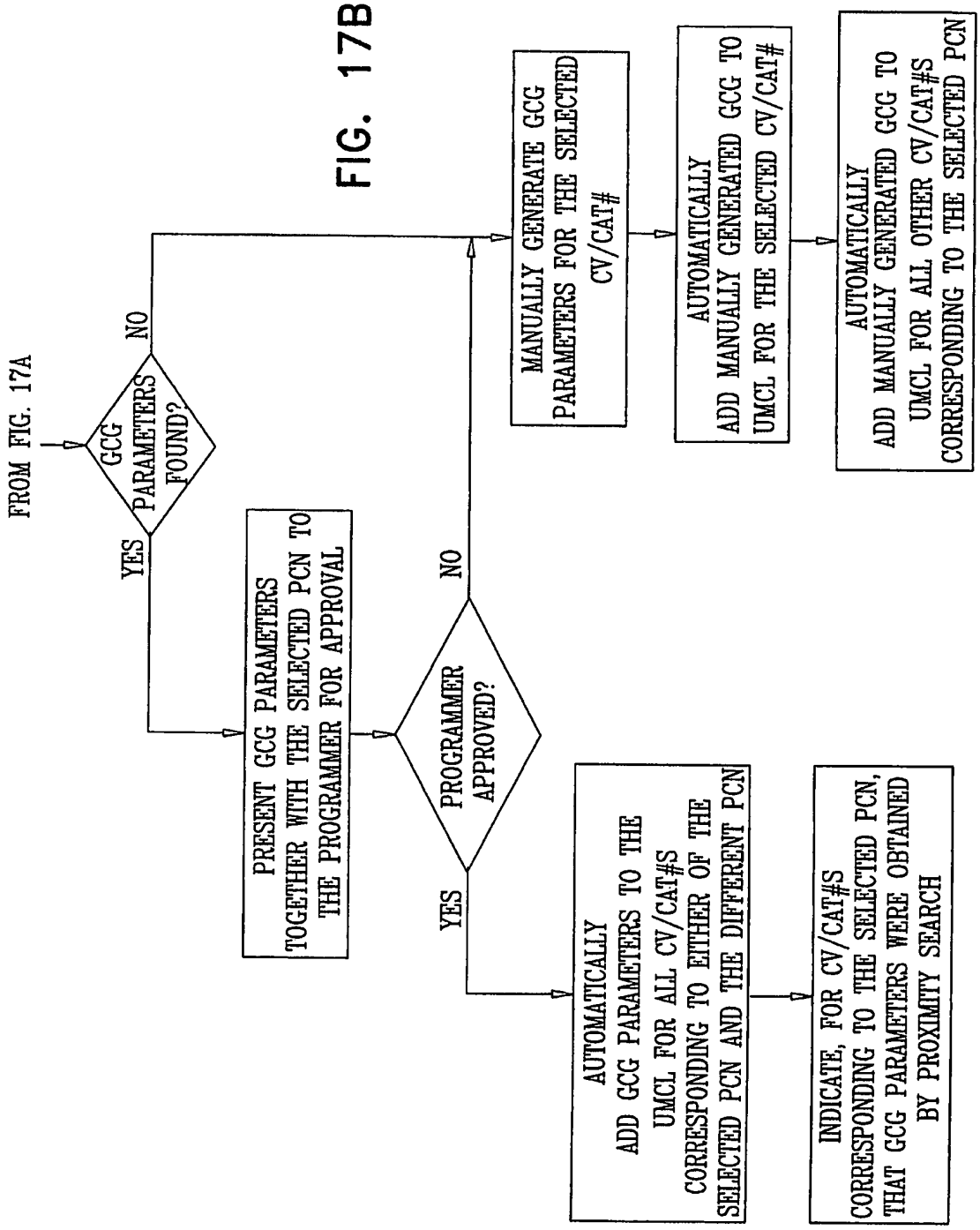

FROM FIG. 17A
GCG PARAMETERS FOUND?
NO
YES
MANUALLY GENERATE GCG PARAMETERS FOR THE SELECTED CV/CAT#
AUTOMATICALLY ADD MANUALLY GENERATED GCG TO UMCL FOR THE SELECTED CV/CAT#
AUTOMATICALLY ADD MANUALLY GENERATED GCG TO UMCL FOR ALL OTHER CV/CAT#S CORRESPONDING TO THE SELECTED PCN
PRESENT GCG PARAMETERS TOGETHER WITH THE SELECTED PCN TO THE PROGRAMMER FOR APPROVAL
PROGRAMMER APPROVED?
NO
YES
AUTOMATICALLY ADD GCG PARAMETERS TO THE UMCL FOR ALL CV/CAT#S CORRESPONDING TO EITHER OF THE SELECTED PCN AND THE DIFFERENT PCN
INDICATE, FOR CV/CAT#S CORRESPONDING TO THE SELECTED PCN, THAT GCG PARAMETERS WERE OBTAINED BY PROXIMITY SEARCH

FIG. 18

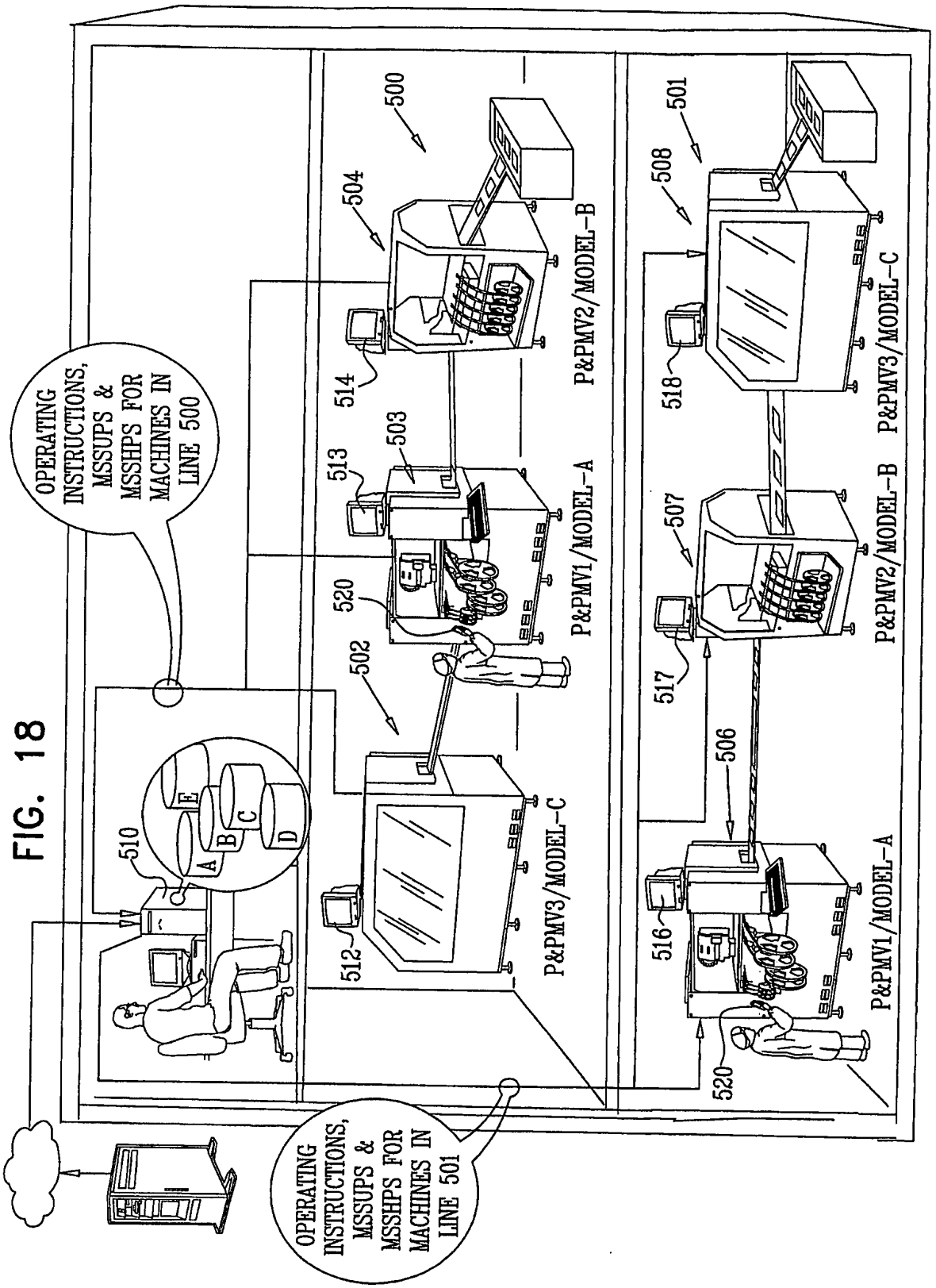

OPERATING INSTRUCTIONS, MSSUPS & MSSHPS FOR MACHINES IN LINE 500
OPERATING INSTRUCTIONS, MSSUPS & MSSHPS FOR MACHINES IN LINE 501
500
501
502
503
504
506
507
508
510
512
513
514
516
517
518
520
A
B
C
D
E
P&PMV1/MODEL-A
P&PMV2/MODEL-B
P&PMV3/MODEL-C
P&PMV1/MODEL-A
P&PMV2/MODEL-B
P&PMV3/MODEL-C

FIG. 19

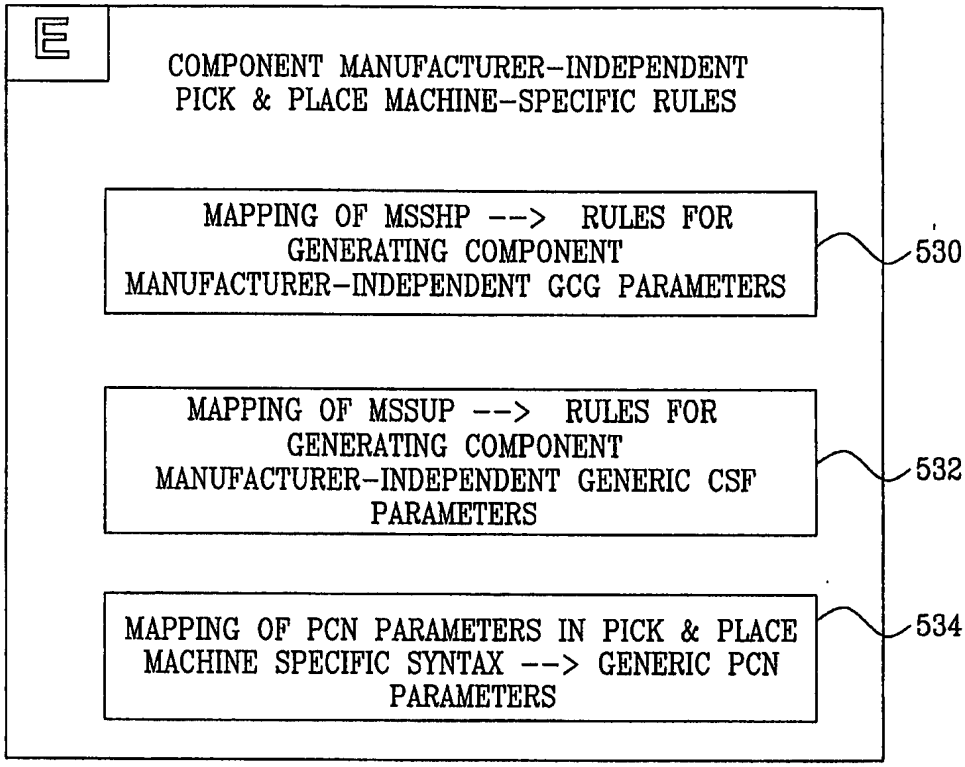

E
COMPONENT MANUFACTURER-INDEPENDENT PICK & PLACE MACHINE-SPECIFIC RULES
MAPPING OF MSSHP --> RULES FOR GENERATING COMPONENT MANUFACTURER-INDEPENDENT GCG PARAMETERS
530
MAPPING OF MSSUP --> RULES FOR GENERATING COMPONENT MANUFACTURER-INDEPENDENT GENERIC CSF PARAMETERS
532
MAPPING OF PCN PARAMETERS IN PICK & PLACE MACHINE SPECIFIC SYNTAX --> GENERIC PCN PARAMETERS
534

FIG. 20A

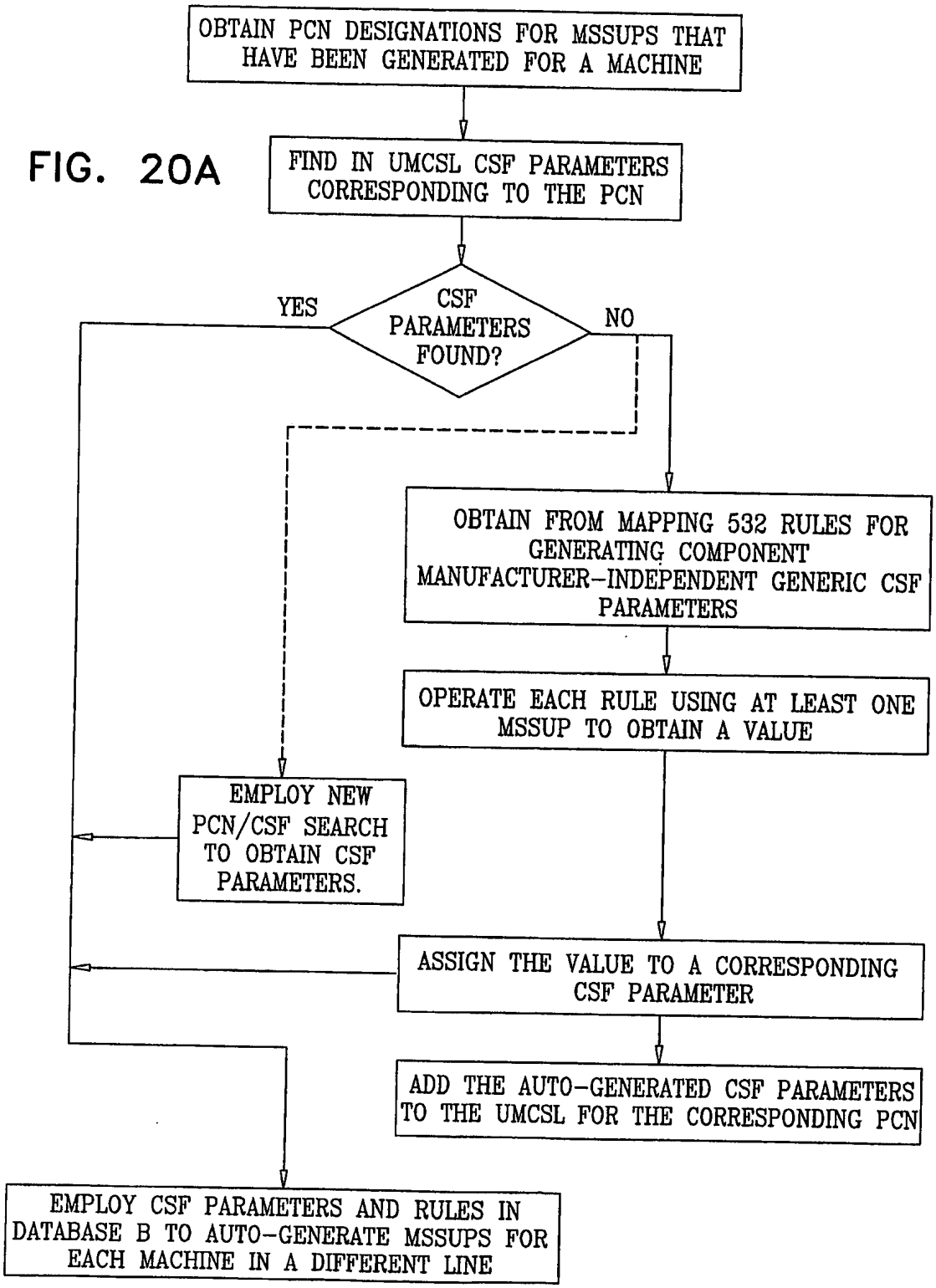

OBTAIN PCN DESIGNATIONS FOR MSSUPS THAT HAVE BEEN GENERATED FOR A MACHINE
FIND IN UMCSL CSF PARAMETERS CORRESPONDING TO THE PCN
CSF PARAMETERS FOUND?
YES
NO
OBTAIN FROM MAPPING 532 RULES FOR GENERATING COMPONENT MANUFACTURER-INDEPENDENT GENERIC CSF PARAMETERS
OPERATE EACH RULE USING AT LEAST ONE MSSUP TO OBTAIN A VALUE
EMPLOY NEW PCN/CSF SEARCH TO OBTAIN CSF PARAMETERS.
ASSIGN THE VALUE TO A CORRESPONDING CSF PARAMETER
ADD THE AUTO-GENERATED CSF PARAMETERS TO THE UMCSL FOR THE CORRESPONDING PCN
EMPLOY CSF PARAMETERS AND RULES IN DATABASE B TO AUTO-GENERATE MSSUPS FOR EACH MACHINE IN A DIFFERENT LINE

FIG. 20B

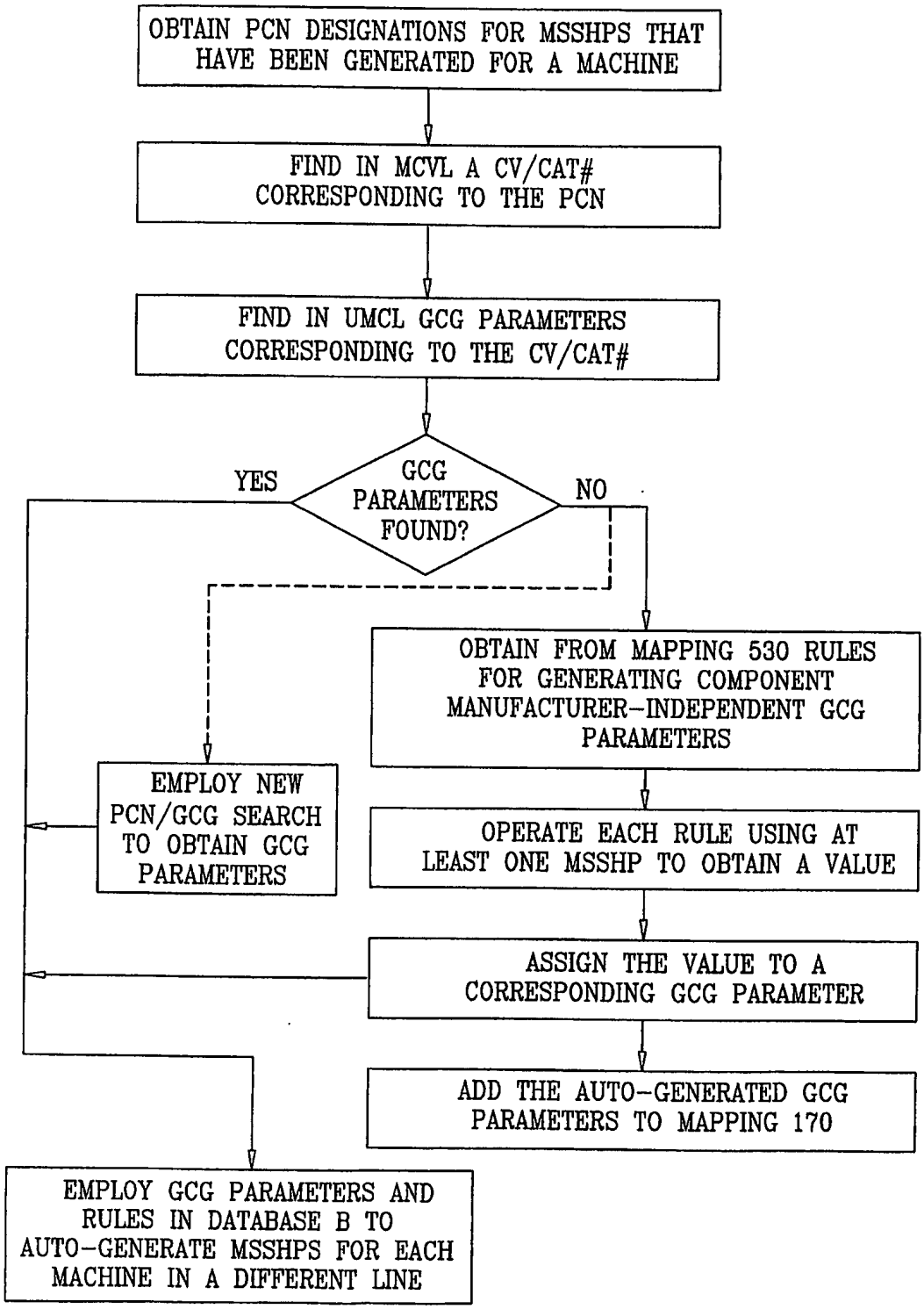
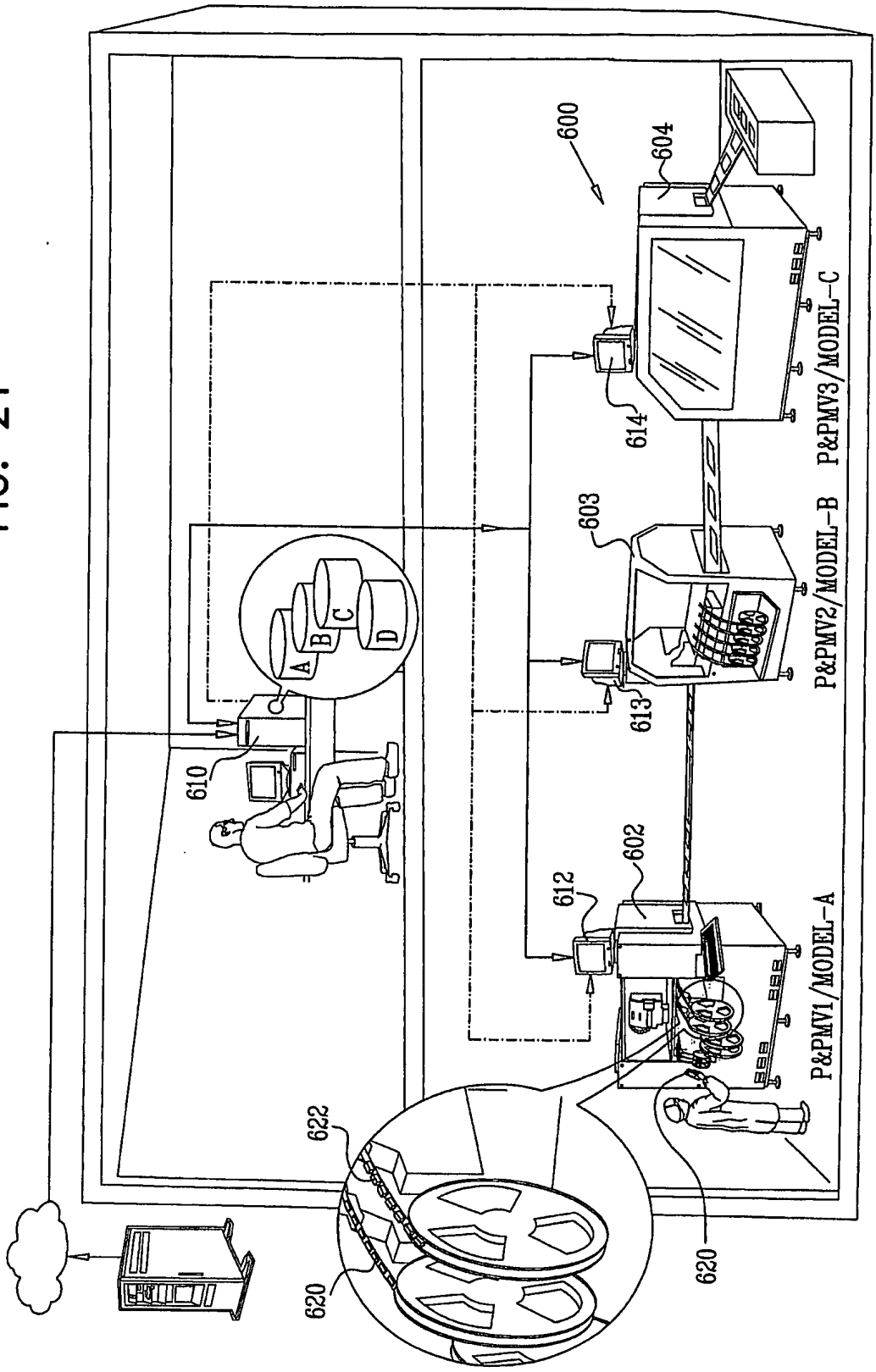

OBTAIN PCN DESIGNATIONS FOR MSSHPS THAT HAVE BEEN GENERATED FOR A MACHINE
FIND IN MCVL A CV/CAT# CORRESPONDING TO THE PCN
FIND IN UMCL GCG PARAMETERS CORRESPONDING TO THE CV/CAT#
GCG PARAMETERS FOUND?
YES
NO
OBTAIN FROM MAPPING 530 RULES FOR GENERATING COMPONENT MANUFACTURER-INDEPENDENT GCG PARAMETERS
EMPLOY NEW PCN/GCG SEARCH TO OBTAIN GCG PARAMETERS
OPERATE EACH RULE USING AT LEAST ONE MSSHP TO OBTAIN A VALUE
ASSIGN THE VALUE TO A CORRESPONDING GCG PARAMETER
ADD THE AUTO-GENERATED GCG PARAMETERS TO MAPPING 170
EMPLOY GCG PARAMETERS AND RULES IN DATABASE B TO AUTO-GENERATE MSSHPS FOR EACH MACHINE IN A DIFFERENT LINE

FIG. 21


600
604
614
603
613
602
612
610
622
620
620
A
B
C
D
P&PMV1/MODEL-A
P&PMV2/MODEL-B
P&PMV3/MODEL-C

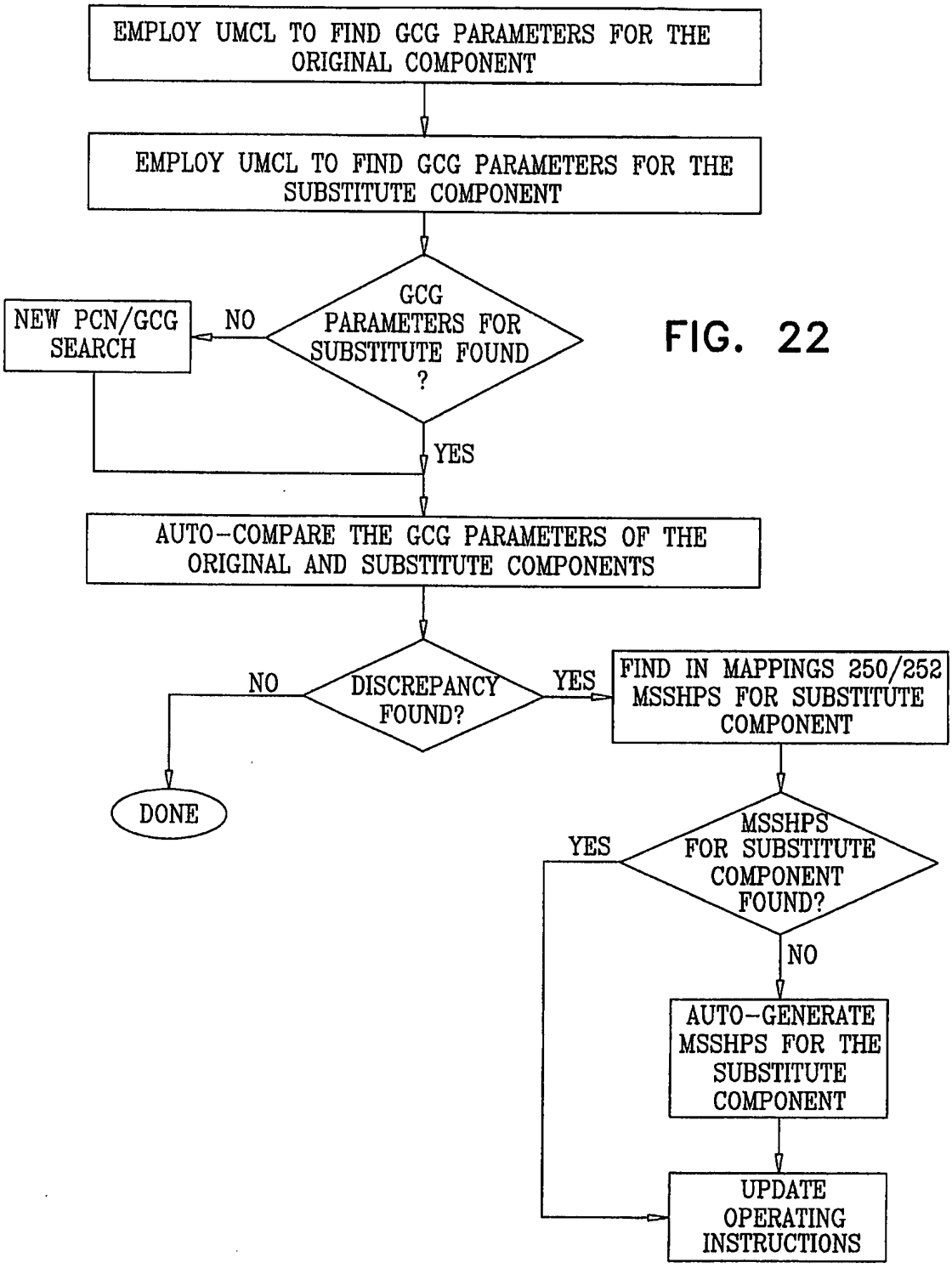

EMPLOY UMCL TO FIND GCG PARAMETERS FOR THE ORIGINAL COMPONENT
EMPLOY UMCL TO FIND GCG PARAMETERS FOR THE SUBSTITUTE COMPONENT
GCG PARAMETERS FOR SUBSTITUTE FOUND ?
NO
NEW PCN/GCG SEARCH
YES
AUTO-COMPARE THE GCG PARAMETERS OF THE ORIGINAL AND SUBSTITUTE COMPONENTS
DISCREPANCY FOUND?
NO
YES
DONE
FIND IN MAPPINGS 250/252 MSSHPS FOR SUBSTITUTE COMPONENT
MSSHPS FOR SUBSTITUTE COMPONENT FOUND?
YES
NO
AUTO-GENERATE MSSHPS FOR THE SUBSTITUTE COMPONENT
UPDATE OPERATING INSTRUCTIONS

FIG. 22

FIG. 23

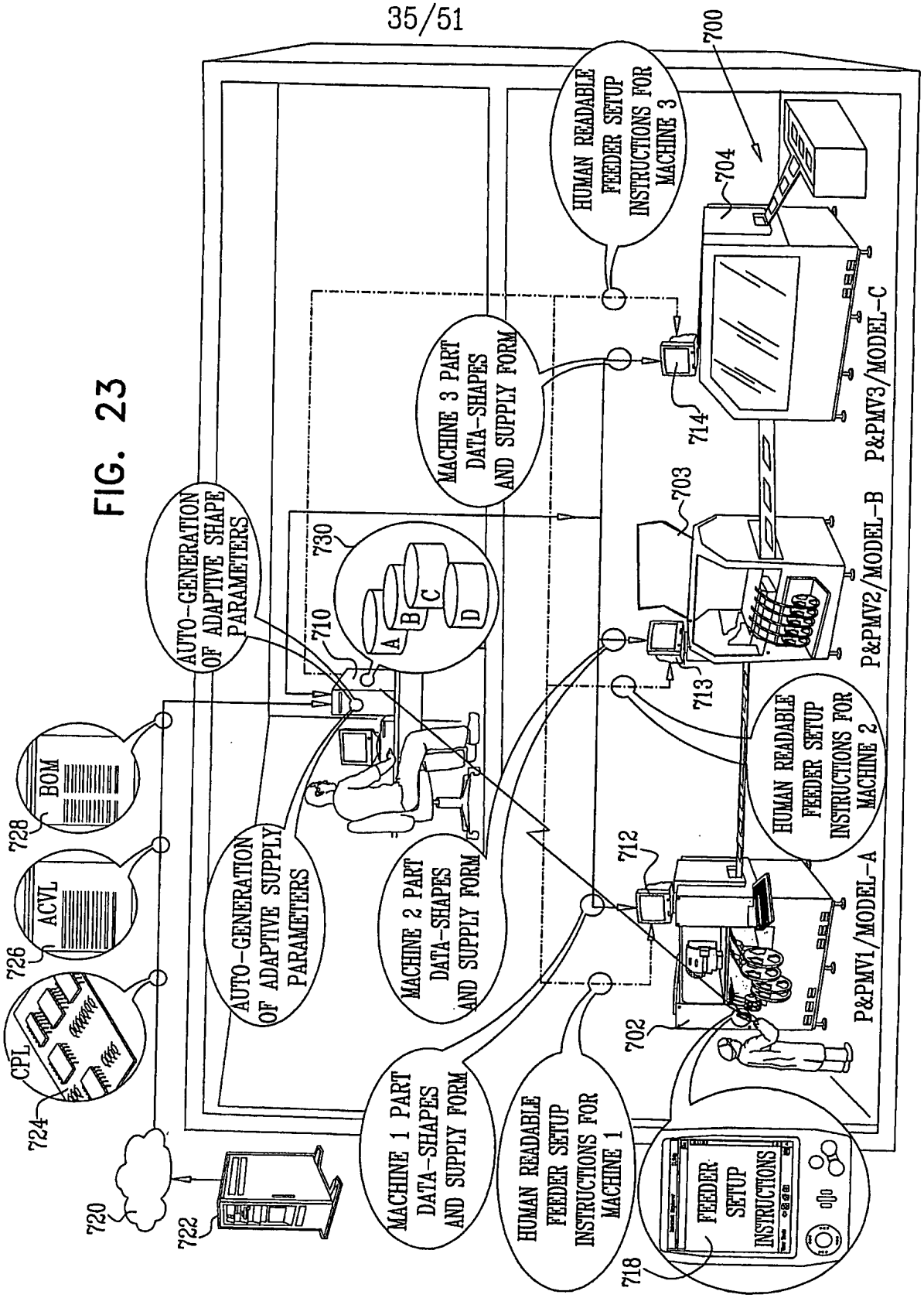

700
704
HUMAN READABLE FEEDER SETUP INSTRUCTIONS FOR MACHINE 3
MACHINE 3 PART DATA-SHAPES AND SUPPLY FORM
714
703
P&PMV3/MODEL-C
P&PMV2/MODEL-B
730
710
AUTO-GENERATION OF ADAPTIVE SHAPE PARAMETERS
A
B
C
D
713
HUMAN READABLE FEEDER SETUP INSTRUCTIONS FOR MACHINE 2
728
BOM
726
ACVL
724
CPL
AUTO-GENERATION OF ADAPTIVE SUPPLY PARAMETERS
MACHINE 2 PART DATA-SHAPES AND SUPPLY FORM
712
720
722
MACHINE 1 PART DATA-SHAPES AND SUPPLY FORM
HUMAN READABLE FEEDER SETUP INSTRUCTIONS FOR MACHINE 1
702
P&PMV1/MODEL-A
718
FEEDER SETUP INSTRUCTIONS

FIG. 24

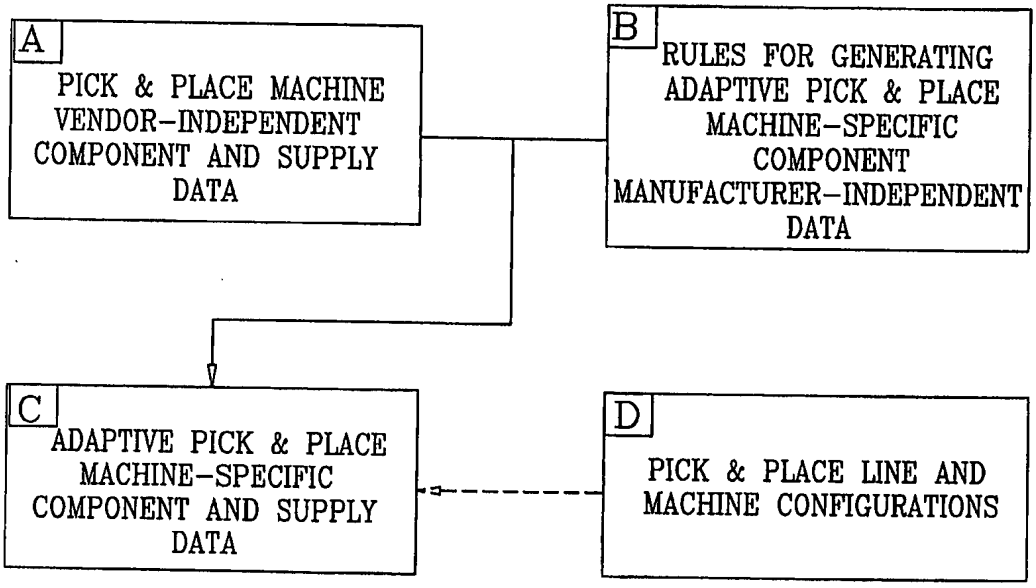

A
PICK & PLACE MACHINE VENDOR-INDEPENDENT COMPONENT AND SUPPLY DATA
B
RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE-SPECIFIC COMPONENT MANUFACTURER-INDEPENDENT DATA
C
ADAPTIVE PICK & PLACE MACHINE-SPECIFIC COMPONENT AND SUPPLY DATA
D
PICK & PLACE LINE AND MACHINE CONFIGURATIONS

FIG. 25

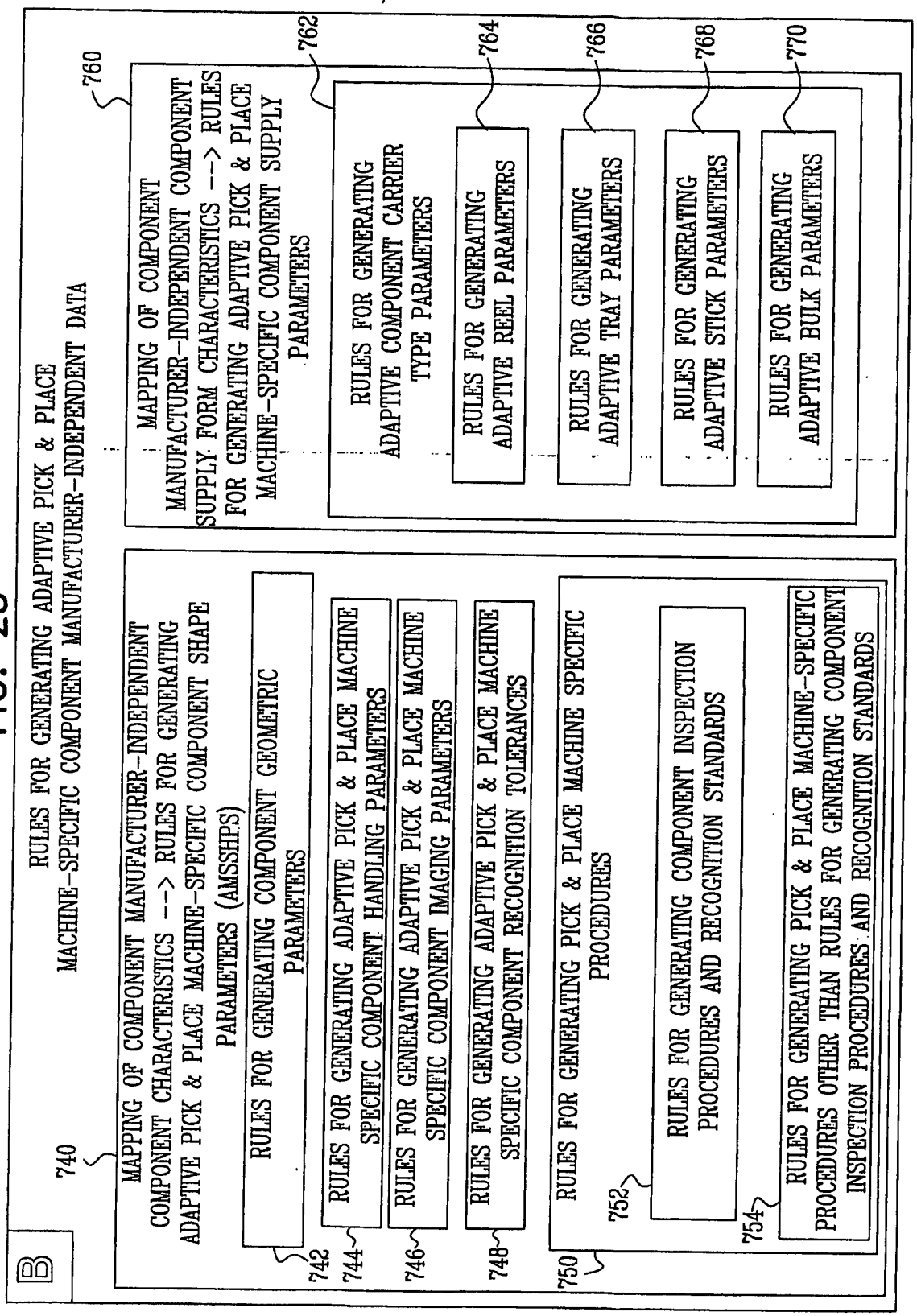

B
RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE-SPECIFIC COMPONENT MANUFACTURER-INDEPENDENT DATA
740
MAPPING OF COMPONENT MANUFACTURER-INDEPENDENT COMPONENT CHARACTERISTICS --> RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE PARAMETERS (AMSSHPS)
742
RULES FOR GENERATING COMPONENT GEOMETRIC PARAMETERS
744
RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT HANDLING PARAMETERS
746
RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT IMAGING PARAMETERS
748
RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT RECOGNITION TOLERANCES
750
RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC PROCEDURES
752
RULES FOR GENERATING COMPONENT INSPECTION PROCEDURES AND RECOGNITION STANDARDS
754
RULES FOR GENERATING PICK & PLACE MACHINE-SPECIFIC PROCEDURES OTHER THAN RULES FOR GENERATING COMPONENT INSPECTION PROCEDURES AND RECOGNITION STANDARDS
760
MAPPING OF COMPONENT MANUFACTURER-INDEPENDENT COMPONENT SUPPLY FORM CHARACTERISTICS --> RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE-SPECIFIC COMPONENT SUPPLY PARAMETERS
762
RULES FOR GENERATING ADAPTIVE COMPONENT CARRIER TYPE PARAMETERS
764
RULES FOR GENERATING ADAPTIVE REEL PARAMETERS
766
RULES FOR GENERATING ADAPTIVE TRAY PARAMETERS
768
RULES FOR GENERATING ADAPTIVE STICK PARAMETERS
770
RULES FOR GENERATING ADAPTIVE BULK PARAMETERS

FIG. 26A

PICK & PLACE MACHINE SPECIFIC COMPONENT TRAY PARAMETER	RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT TRAY PARAMETER
FEEDER NAME	TRAY LIFTER: IF { FRONT TRAY LIFTER} THEN =NAME A ELSE THEN=NAME B
• • •	• • •

772

FIG. 26B

ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT SHAPE PARAMETER / COMPONENT MANUFACTURER-INDEPENDENT COMPONENT CHARACTERISTIC (COMPONENT TYPE)	BGA 782	QFP 784	CONNECTOR 786
VISION ALGORITHM	FOR BACKLIGHTING: IF {#LEADS > 100}THEN NOT RELEVANT ELSE =105 FOR FRONTLIGHTING: =103	FOR BACKLIGHTING: NOT RELEVANT FOR FRONTLIGHTING: =107	IF {LEAD-PITCH < 0.01} THEN USE FRONTLIGHTING =120 ELSE USE FRONTLIGHTING =130 OR BACKLIGHTING =150
...	...	...	...

FIG. 27

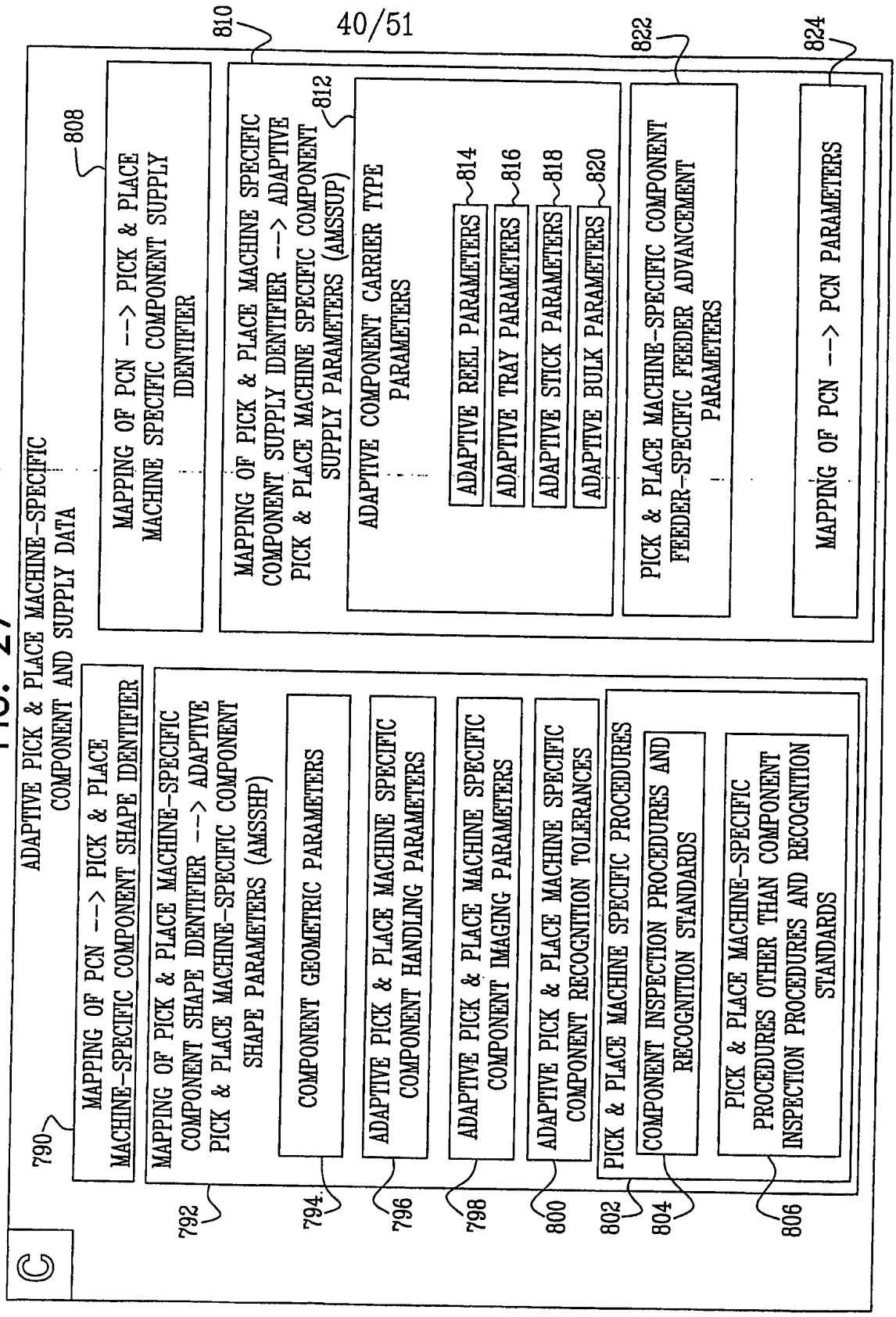
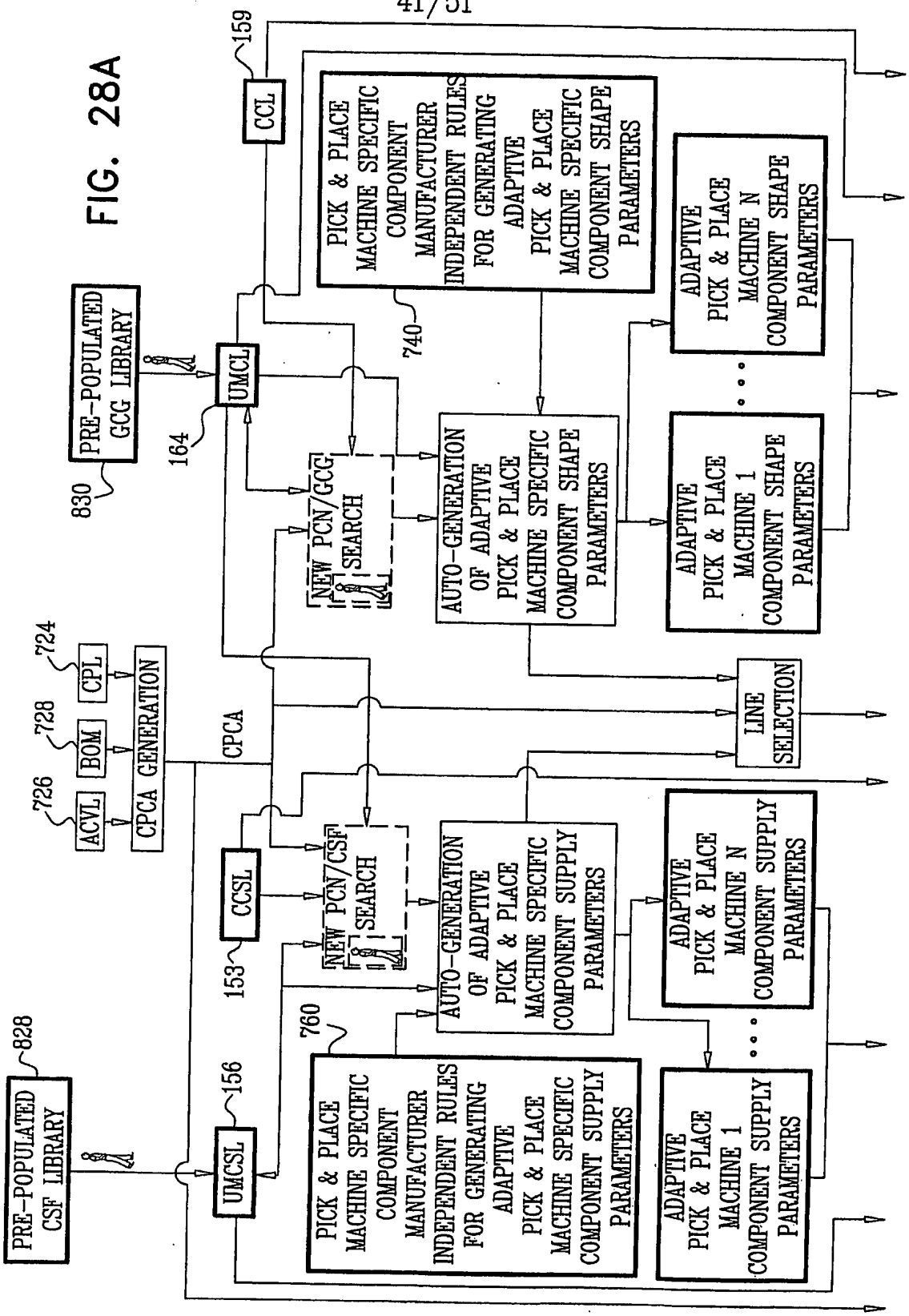

C
ADAPTIVE PICK & PLACE MACHINE-SPECIFIC COMPONENT AND SUPPLY DATA
790
MAPPING OF PCN --> PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE IDENTIFIER
792
MAPPING OF PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE IDENTIFIER --> ADAPTIVE PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE PARAMETERS (AMSSHP)
794
COMPONENT GEOMETRIC PARAMETERS
796
ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT HANDLING PARAMETERS
798
ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT IMAGING PARAMETERS
800
ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT RECOGNITION TOLERANCES
802
PICK & PLACE MACHINE SPECIFIC PROCEDURES
804
COMPONENT INSPECTION PROCEDURES AND RECOGNITION STANDARDS
806
PICK & PLACE MACHINE-SPECIFIC PROCEDURES OTHER THAN COMPONENT INSPECTION PROCEDURES AND RECOGNITION STANDARDS
808
MAPPING OF PCN --> PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY IDENTIFIER
810
MAPPING OF PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY IDENTIFIER --> ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY PARAMETERS (AMSSUP)
812
ADAPTIVE COMPONENT CARRIER TYPE PARAMETERS
814
ADAPTIVE REEL PARAMETERS
816
ADAPTIVE TRAY PARAMETERS
818
ADAPTIVE STICK PARAMETERS
820
ADAPTIVE BULK PARAMETERS
822
PICK & PLACE MACHINE-SPECIFIC COMPONENT FEEDER-SPECIFIC FEEDER ADVANCEMENT PARAMETERS
824
MAPPING OF PCN --> PCN PARAMETERS

FIG. 28A


PRE-POPULATED CSF LIBRARY
828
UMCSL
156
PRE-POPULATED GCG LIBRARY
830
UMCL
164
CCL
159
CCSL
153
CPCA GENERATION
CPCA
ACVL
726
BOM
728
CPL
724
NEW PCN/CSF SEARCH
NEW PCN/GCG SEARCH
PICK & PLACE MACHINE SPECIFIC COMPONENT MANUFACTURER INDEPENDENT RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY PARAMETERS
760
PICK & PLACE MACHINE SPECIFIC COMPONENT MANUFACTURER INDEPENDENT RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT SHAPE PARAMETERS
740
AUTO-GENERATION OF ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY PARAMETERS
AUTO-GENERATION OF ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT SHAPE PARAMETERS
ADAPTIVE PICK & PLACE MACHINE 1 COMPONENT SUPPLY PARAMETERS
ADAPTIVE PICK & PLACE MACHINE N COMPONENT SUPPLY PARAMETERS
ADAPTIVE PICK & PLACE MACHINE 1 COMPONENT SHAPE PARAMETERS
ADAPTIVE PICK & PLACE MACHINE N COMPONENT SHAPE PARAMETERS
LINE SELECTION

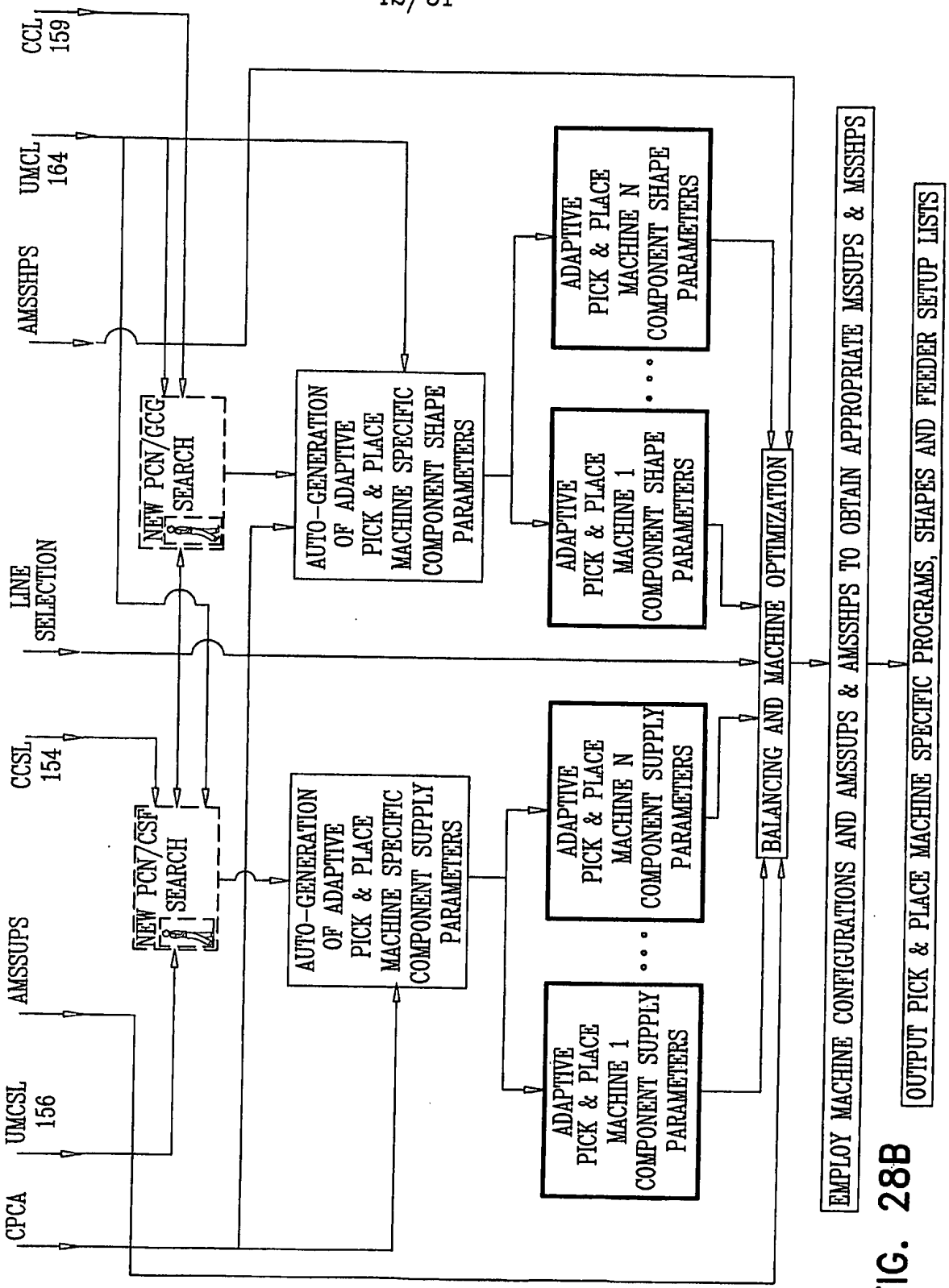
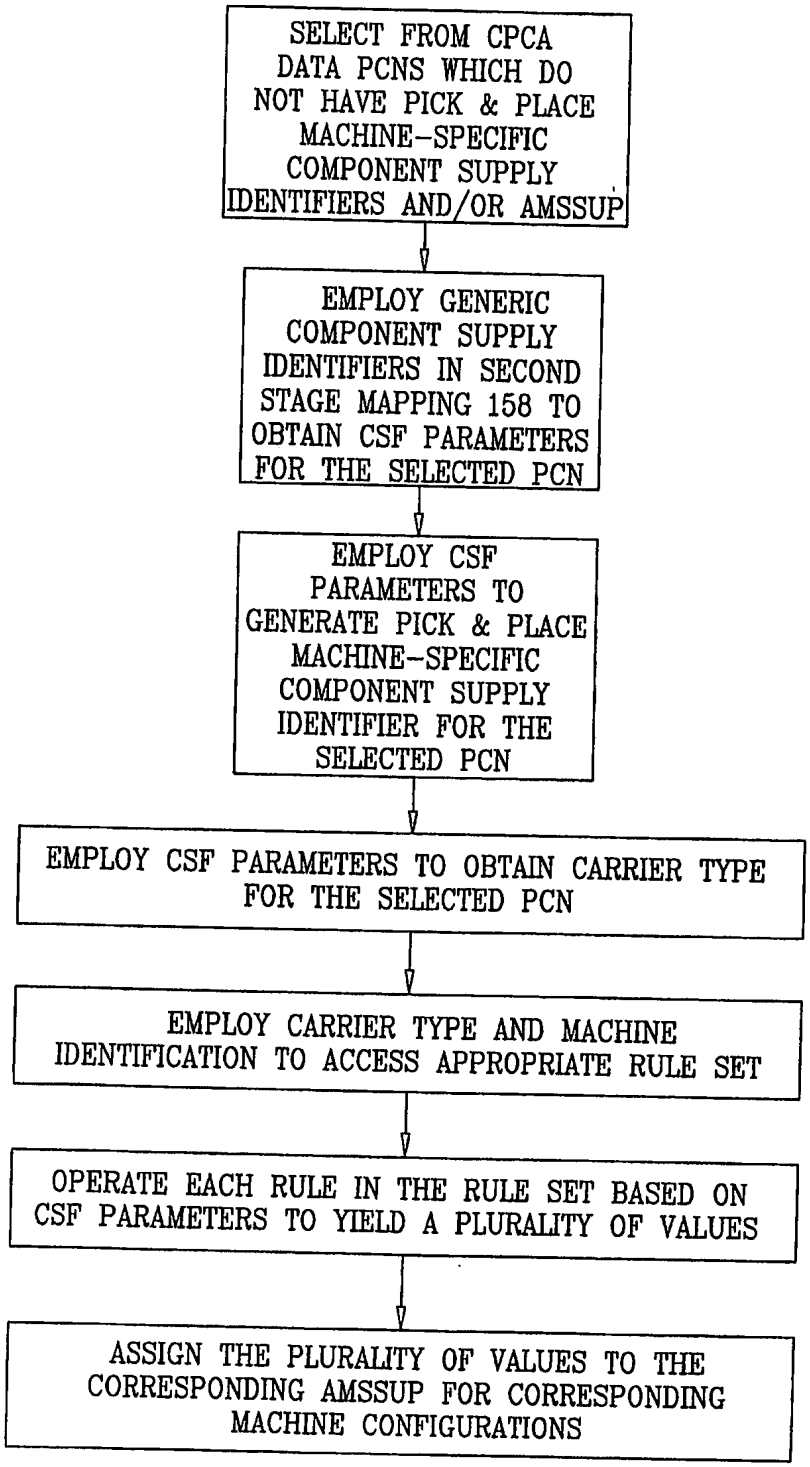

CCL 159
UMCL 164
AMSSHPS
LINE SELECTION
CCSL 154
AMSSUPS
UMCSL 156
CPCA
NEW PCN/GCG SEARCH
NEW PCN/CSF SEARCH
AUTO-GENERATION OF ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT SHAPE PARAMETERS
AUTO-GENERATION OF ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT SUPPLY PARAMETERS
ADAPTIVE PICK & PLACE MACHINE 1 COMPONENT SHAPE PARAMETERS
ADAPTIVE PICK & PLACE MACHINE N COMPONENT SHAPE PARAMETERS
ADAPTIVE PICK & PLACE MACHINE 1 COMPONENT SUPPLY PARAMETERS
ADAPTIVE PICK & PLACE MACHINE N COMPONENT SUPPLY PARAMETERS
BALANCING AND MACHINE OPTIMIZATION
EMPLOY MACHINE CONFIGURATIONS AND AMSSUPS & AMSSHPS TO OBTAIN APPROPRIATE MSSUPS & MSSHPS
OUTPUT PICK & PLACE MACHINE SPECIFIC PROGRAMS, SHAPES AND FEEDER SETUP LISTS

FIG. 28B

FIG. 29


SELECT FROM CPCA DATA PCNS WHICH DO NOT HAVE PICK & PLACE MACHINE-SPECIFIC COMPONENT SUPPLY IDENTIFIERS AND/OR AMSSUP
EMPLOY GENERIC COMPONENT SUPPLY IDENTIFIERS IN SECOND STAGE MAPPING 158 TO OBTAIN CSF PARAMETERS FOR THE SELECTED PCN
EMPLOY CSF PARAMETERS TO GENERATE PICK & PLACE MACHINE-SPECIFIC COMPONENT SUPPLY IDENTIFIER FOR THE SELECTED PCN
EMPLOY CSF PARAMETERS TO OBTAIN CARRIER TYPE FOR THE SELECTED PCN
EMPLOY CARRIER TYPE AND MACHINE IDENTIFICATION TO ACCESS APPROPRIATE RULE SET
OPERATE EACH RULE IN THE RULE SET BASED ON CSF PARAMETERS TO YIELD A PLURALITY OF VALUES
ASSIGN THE PLURALITY OF VALUES TO THE CORRESPONDING AMSSUP FOR CORRESPONDING MACHINE CONFIGURATIONS

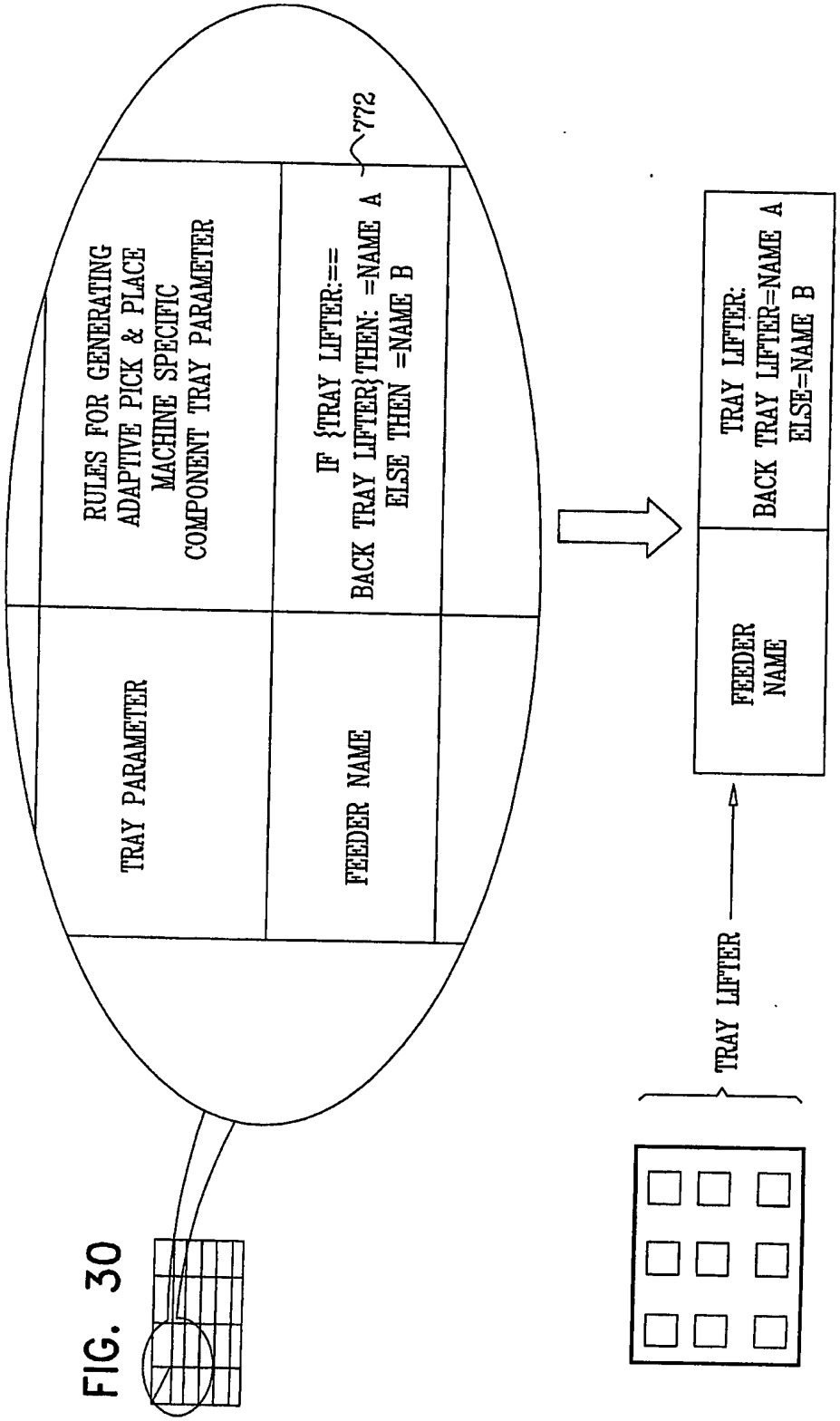
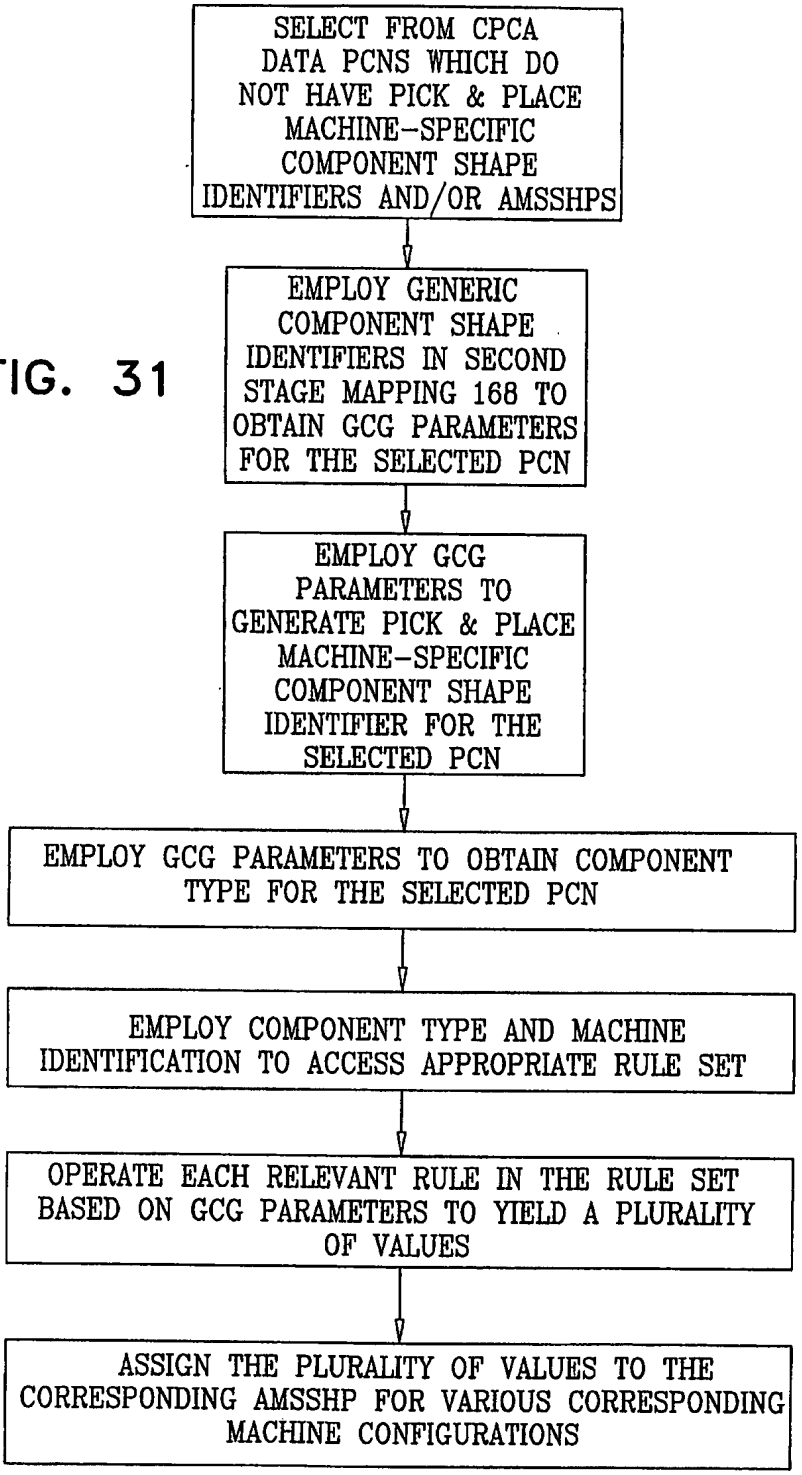

772
RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT TRAY PARAMETER
IF {TRAY LIFTER:== BACK TRAY LIFTER}THEN: =NAME A ELSE THEN =NAME B
TRAY PARAMETER
FEEDER NAME
TRAY LIFTER: BACK TRAY LIFTER=NAME A ELSE=NAME B
FEEDER NAME
TRAY LIFTER

FIG. 30

FIG. 31


SELECT FROM CPCA DATA PCNS WHICH DO NOT HAVE PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE IDENTIFIERS AND/OR AMSSHPS
EMPLOY GENERIC COMPONENT SHAPE IDENTIFIERS IN SECOND STAGE MAPPING 168 TO OBTAIN GCG PARAMETERS FOR THE SELECTED PCN
EMPLOY GCG PARAMETERS TO GENERATE PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE IDENTIFIER FOR THE SELECTED PCN
EMPLOY GCG PARAMETERS TO OBTAIN COMPONENT TYPE FOR THE SELECTED PCN
EMPLOY COMPONENT TYPE AND MACHINE IDENTIFICATION TO ACCESS APPROPRIATE RULE SET
OPERATE EACH RELEVANT RULE IN THE RULE SET BASED ON GCG PARAMETERS TO YIELD A PLURALITY OF VALUES
ASSIGN THE PLURALITY OF VALUES TO THE CORRESPONDING AMSSHP FOR VARIOUS CORRESPONDING MACHINE CONFIGURATIONS

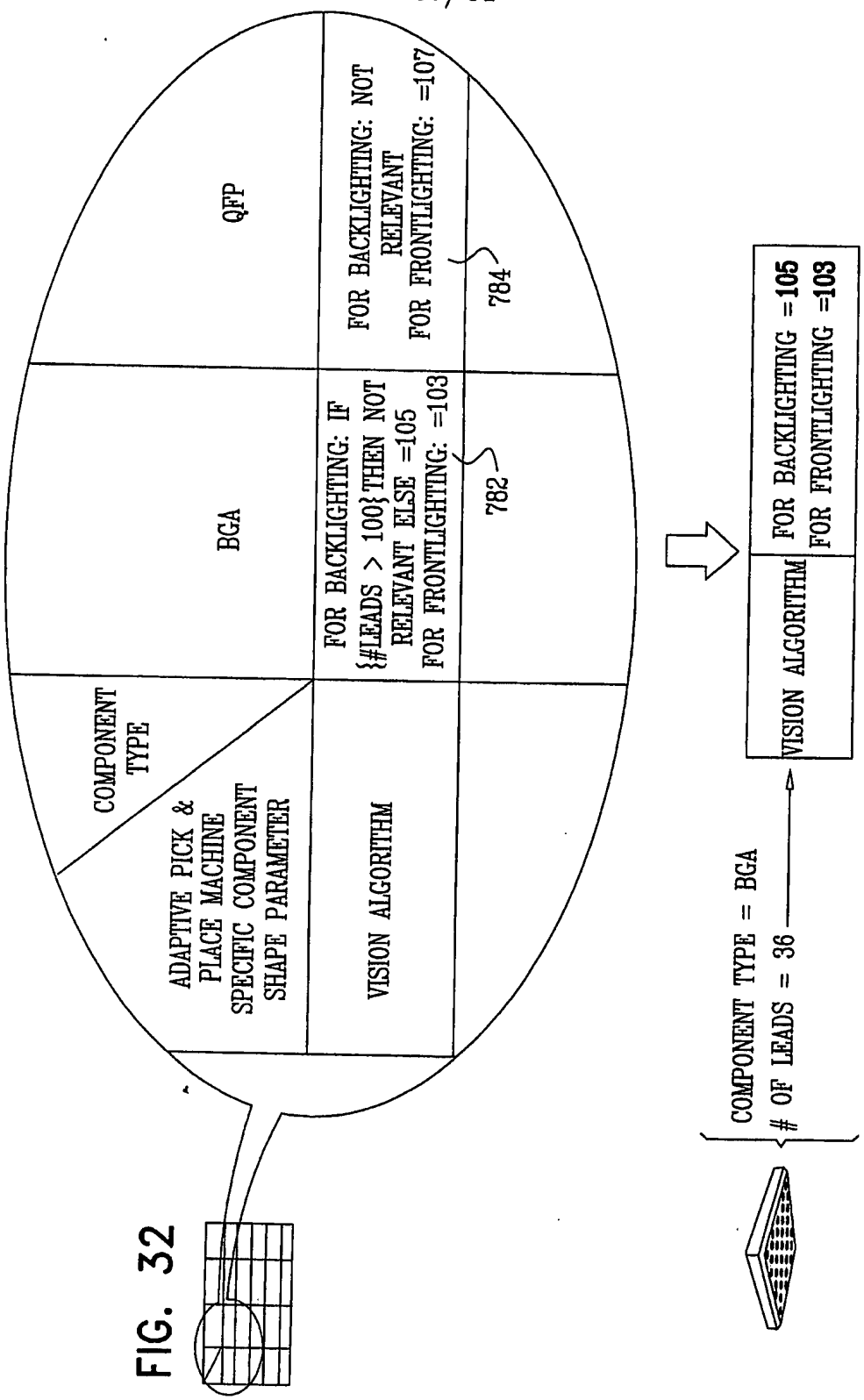

COMPONENT TYPE
ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT SHAPE PARAMETER
VISION ALGORITHM
BGA
FOR BACKLIGHTING: IF {#LEADS > 100} THEN NOT RELEVANT ELSE =105
FOR FRONTLIGHTING: =103
782
QFP
FOR BACKLIGHTING: NOT RELEVANT
FOR FRONTLIGHTING: =107
784
COMPONENT TYPE = BGA
OF LEADS = 36
VISION ALGORITHM
FOR BACKLIGHTING =105
FOR FRONTLIGHTING =103

FIG. 32

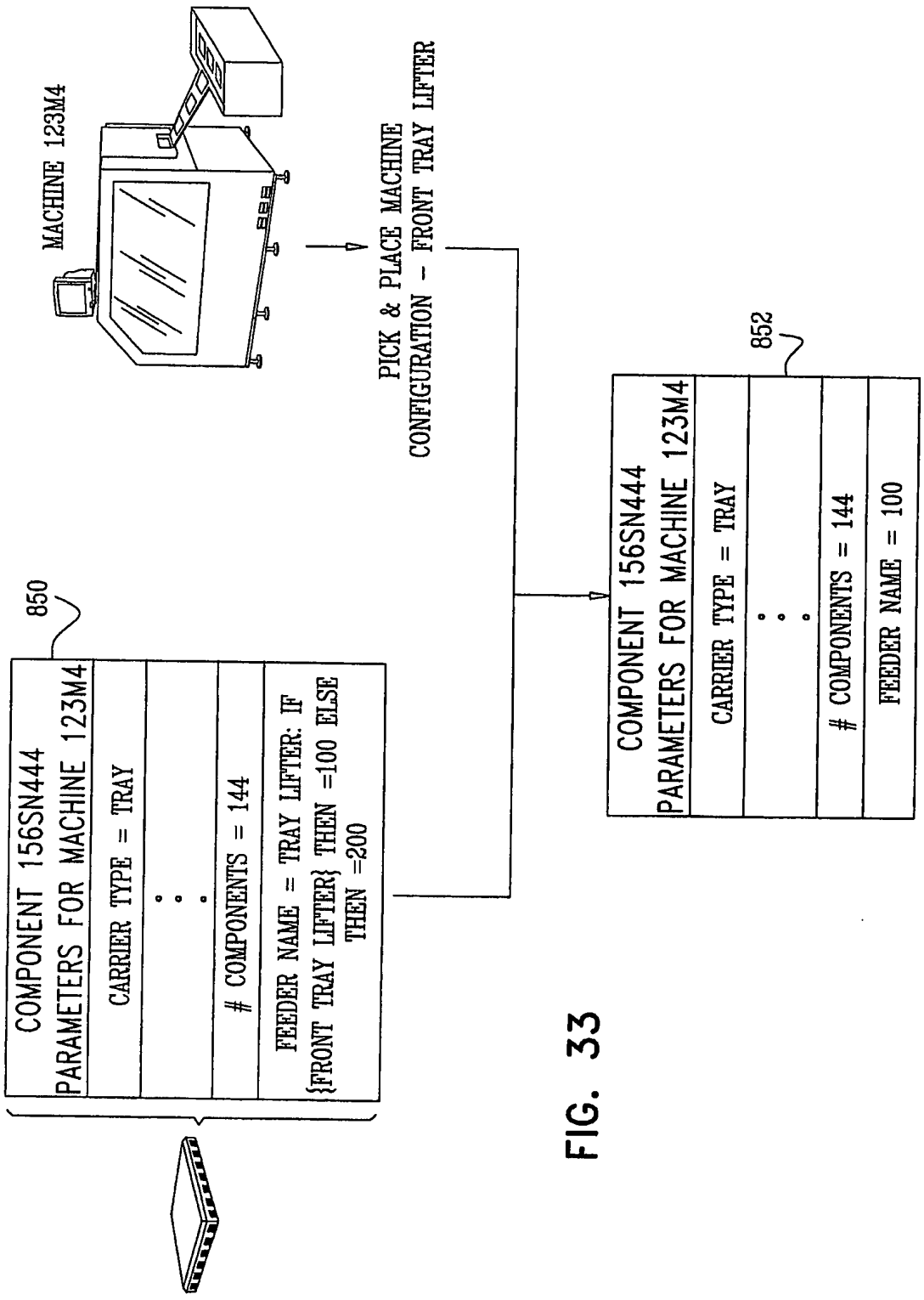

MACHINE 123M4
PICK & PLACE MACHINE
CONFIGURATION - FRONT TRAY LIFTER
850
COMPONENT 156SN444
PARAMETERS FOR MACHINE 123M4
CARRIER TYPE = TRAY
COMPONENTS = 144
FEEDER NAME = TRAY LIFTER: IF
{FRONT TRAY LIFTER} THEN =100 ELSE
THEN =200
852
COMPONENT 156SN444
PARAMETERS FOR MACHINE 123M4
CARRIER TYPE = TRAY
COMPONENTS = 144
FEEDER NAME = 100

FIG. 33

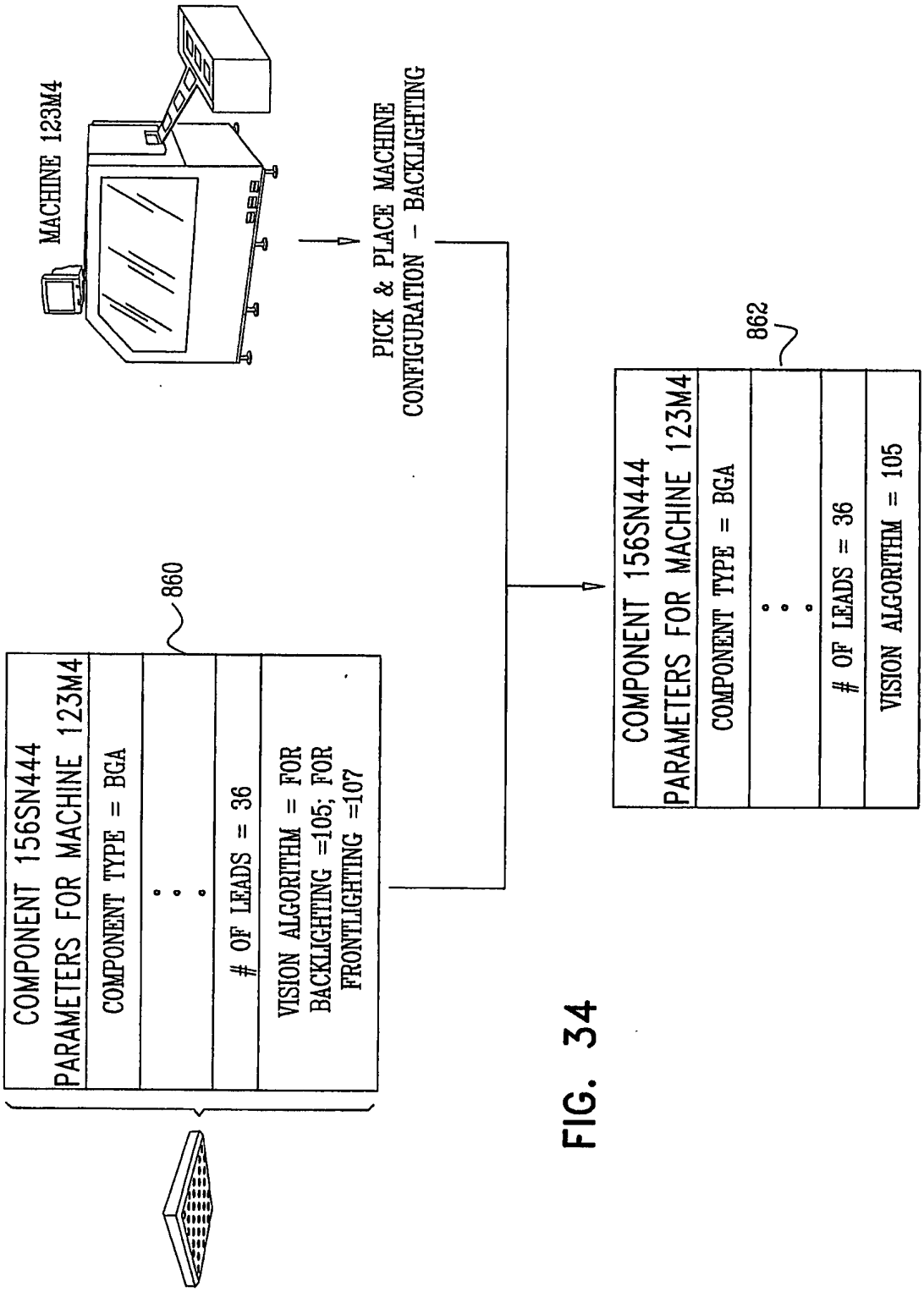

MACHINE 123M4
PICK & PLACE MACHINE
CONFIGURATION - BACKLIGHTING
860
COMPONENT 156SN444
PARAMETERS FOR MACHINE 123M4
COMPONENT TYPE = BGA
OF LEADS = 36
VISION ALGORITHM = FOR
BACKLIGHTING =105; FOR
FRONTLIGHTING =107
862
COMPONENT 156SN444
PARAMETERS FOR MACHINE 123M4
COMPONENT TYPE = BGA
OF LEADS = 36
VISION ALGORITHM = 105

FIG. 34

FIG. 35

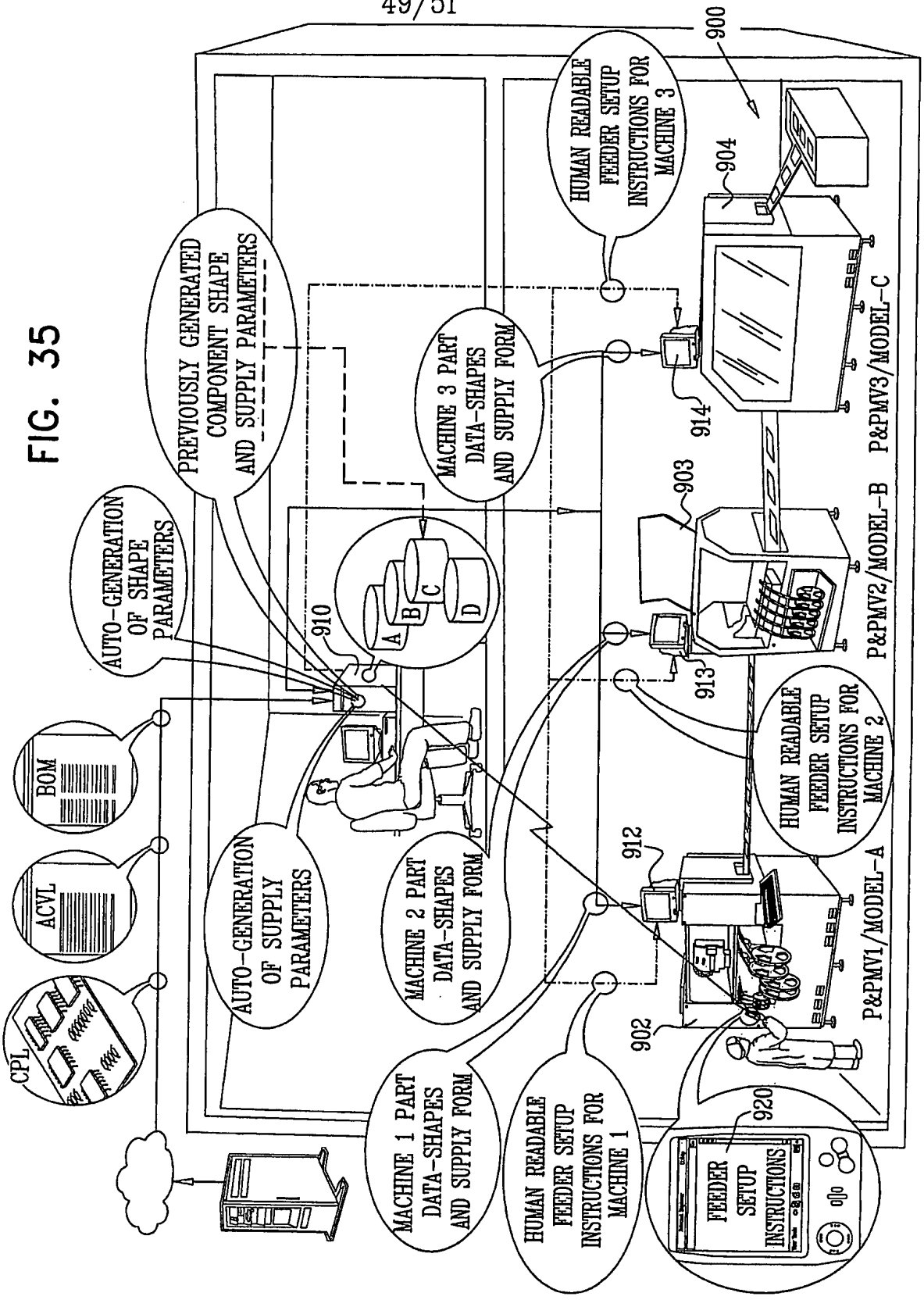

900
904
914
903
913
912
902
920
910
A
B
C
D
BOM
ACVL
CPL
PREVIOUSLY GENERATED COMPONENT SHAPE AND SUPPLY PARAMETERS
AUTO-GENERATION OF SHAPE PARAMETERS
AUTO-GENERATION OF SUPPLY PARAMETERS
MACHINE 1 PART DATA-SHAPES AND SUPPLY FORM
MACHINE 2 PART DATA-SHAPES AND SUPPLY FORM
MACHINE 3 PART DATA-SHAPES AND SUPPLY FORM
HUMAN READABLE FEEDER SETUP INSTRUCTIONS FOR MACHINE 1
HUMAN READABLE FEEDER SETUP INSTRUCTIONS FOR MACHINE 2
HUMAN READABLE FEEDER SETUP INSTRUCTIONS FOR MACHINE 3
FEEDER SETUP INSTRUCTIONS
P&PMV1/MODEL-A
P&PMV2/MODEL-B
P&PMV3/MODEL-C

FIG. 36

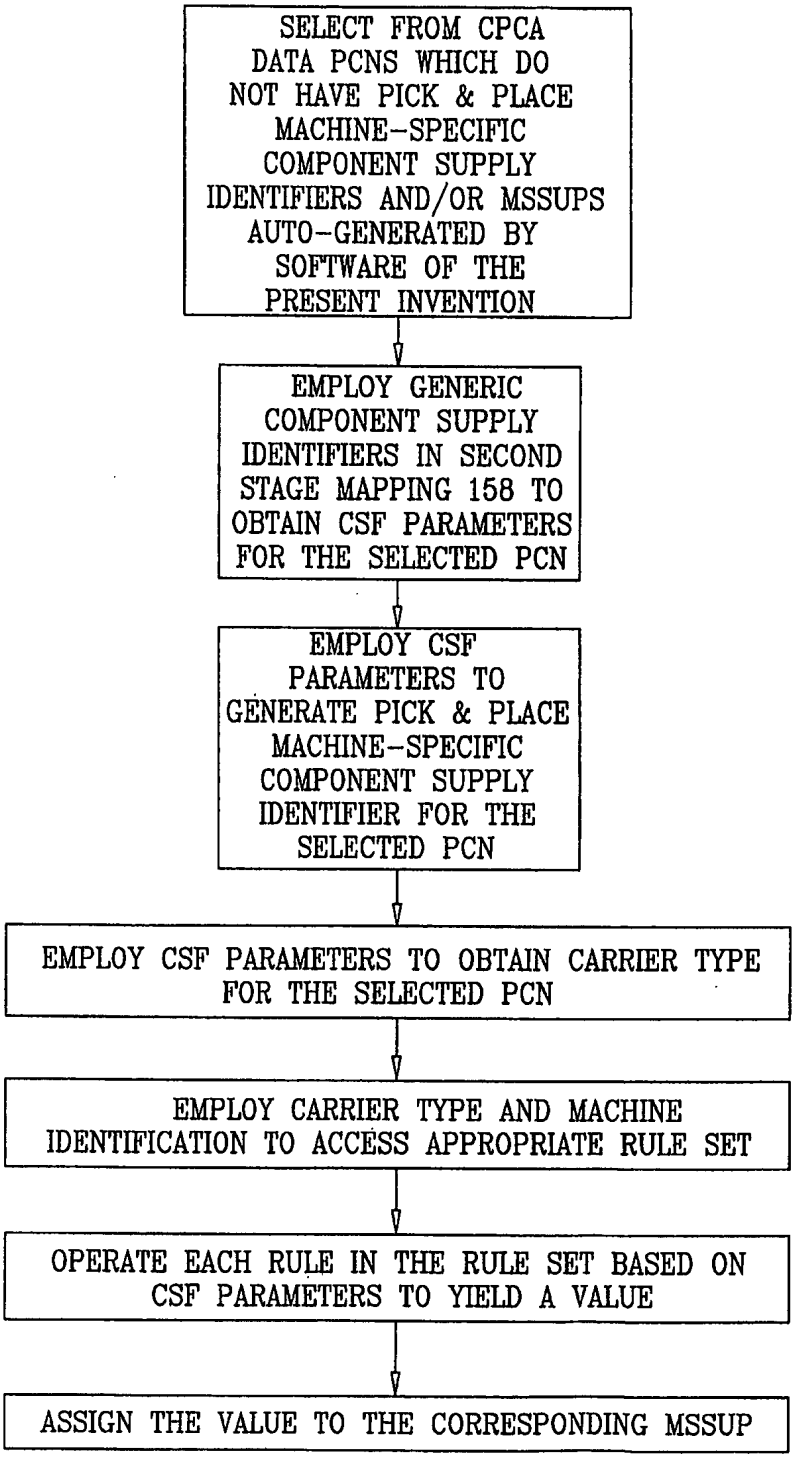
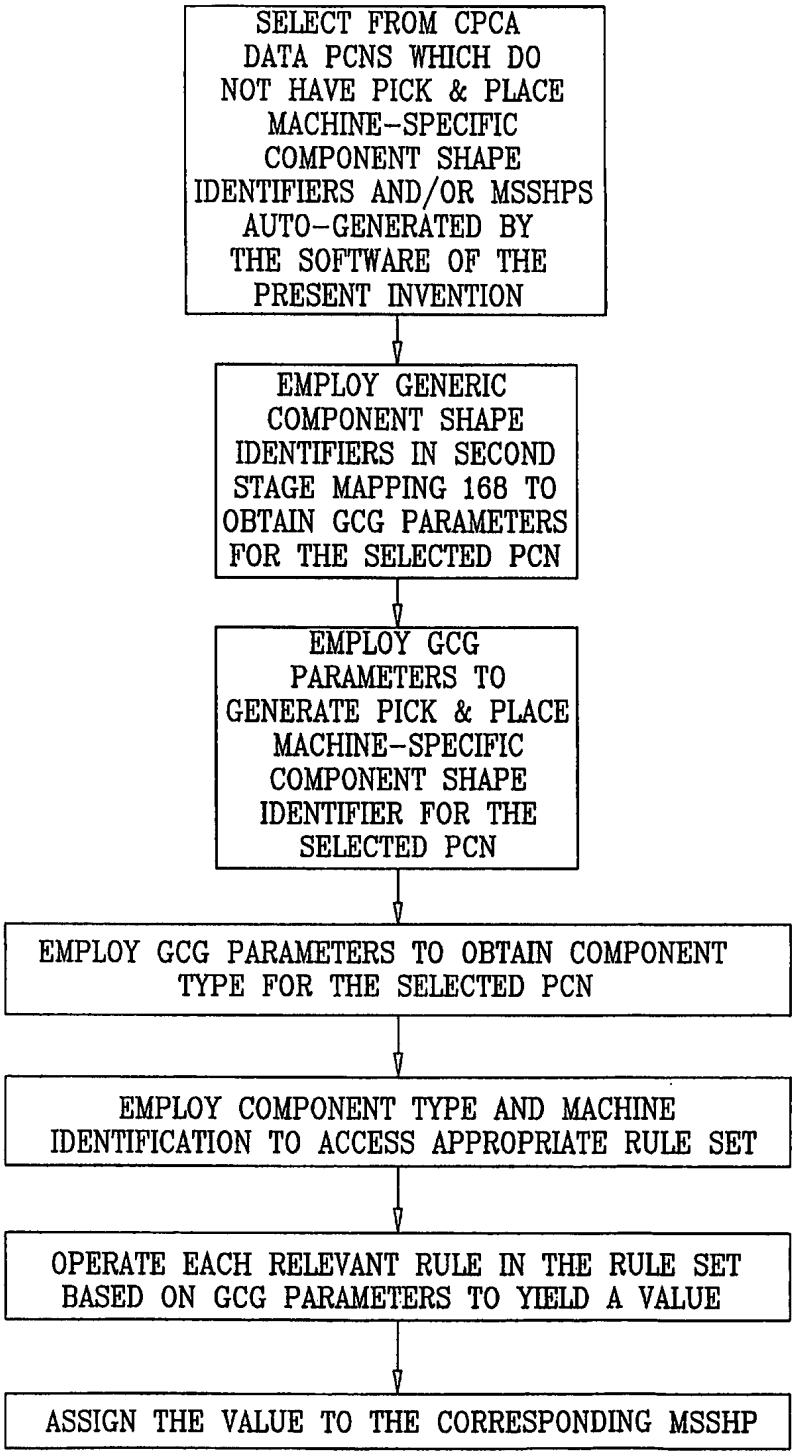

SELECT FROM CPCA DATA PCNS WHICH DO NOT HAVE PICK & PLACE MACHINE-SPECIFIC COMPONENT SUPPLY IDENTIFIERS AND/OR MSSUPS AUTO-GENERATED BY SOFTWARE OF THE PRESENT INVENTION
EMPLOY GENERIC COMPONENT SUPPLY IDENTIFIERS IN SECOND STAGE MAPPING 158 TO OBTAIN CSF PARAMETERS FOR THE SELECTED PCN
EMPLOY CSF PARAMETERS TO GENERATE PICK & PLACE MACHINE-SPECIFIC COMPONENT SUPPLY IDENTIFIER FOR THE SELECTED PCN
EMPLOY CSF PARAMETERS TO OBTAIN CARRIER TYPE FOR THE SELECTED PCN
EMPLOY CARRIER TYPE AND MACHINE IDENTIFICATION TO ACCESS APPROPRIATE RULE SET
OPERATE EACH RULE IN THE RULE SET BASED ON CSF PARAMETERS TO YIELD A VALUE
ASSIGN THE VALUE TO THE CORRESPONDING MSSUP

FIG. 37


SELECT FROM CPCA DATA PCNS WHICH DO NOT HAVE PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE IDENTIFIERS AND/OR MSSHPS AUTO-GENERATED BY THE SOFTWARE OF THE PRESENT INVENTION
EMPLOY GENERIC COMPONENT SHAPE IDENTIFIERS IN SECOND STAGE MAPPING 168 TO OBTAIN GCG PARAMETERS FOR THE SELECTED PCN
EMPLOY GCG PARAMETERS TO GENERATE PICK & PLACE MACHINE-SPECIFIC COMPONENT SHAPE IDENTIFIER FOR THE SELECTED PCN
EMPLOY GCG PARAMETERS TO OBTAIN COMPONENT TYPE FOR THE SELECTED PCN
EMPLOY COMPONENT TYPE AND MACHINE IDENTIFICATION TO ACCESS APPROPRIATE RULE SET
OPERATE EACH RELEVANT RULE IN THE RULE SET BASED ON GCG PARAMETERS TO YIELD A VALUE
ASSIGN THE VALUE TO THE CORRESPONDING MSSHP